McGraw-Hill DIGEST

OCTOBER
1951

BUSINESS · ENGINEERING · INDUSTRY

Glass Panel That Glows—Page 25

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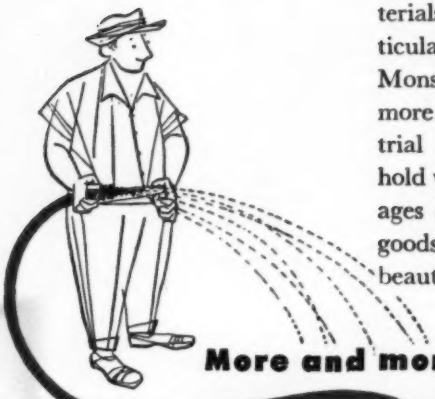

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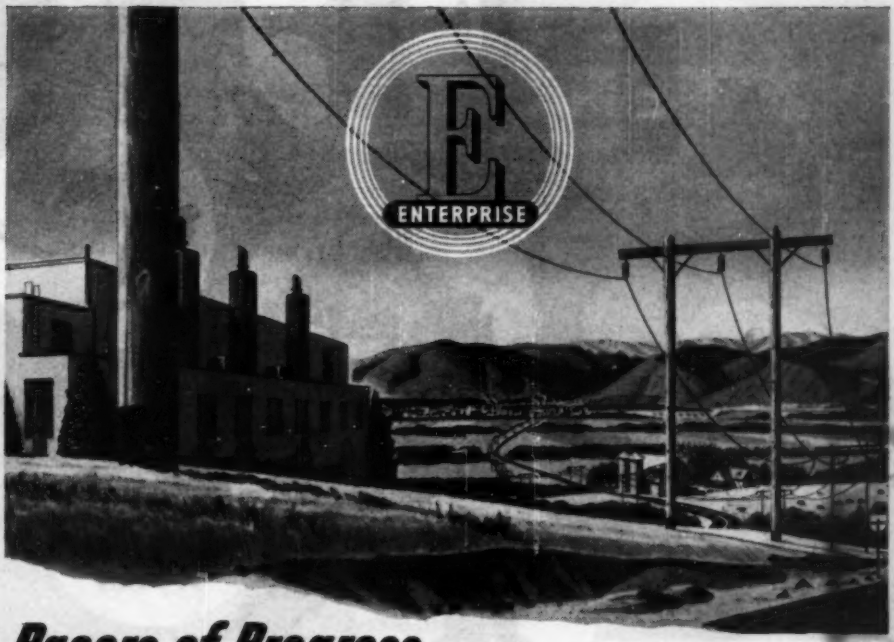

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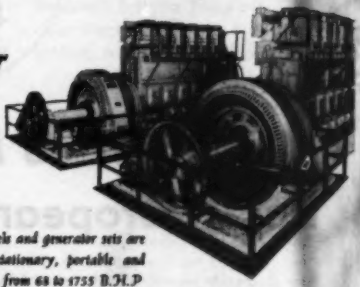

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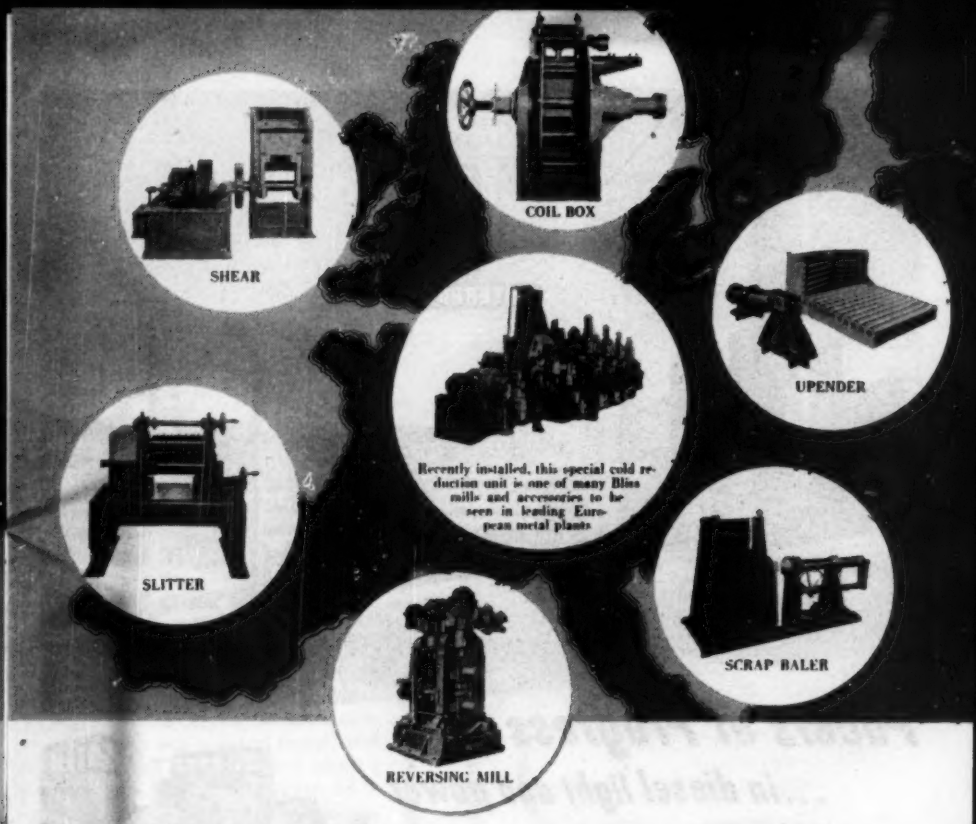
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OCTOBER CONTENTS

Report to Management

How To Plan Product Colors 61

Help for Foreign Development 19

Modern Power-Plant Design 22

Glass Panel That Glows 25

Industrial Color Matcher 28

Predicts Mineral Futures 32

Bridge Raised by Air Jacks 38

How To Raise Metal Capacity 49

Electroformed Tooling 56

AVIATION

Ceramic Liners Boost Life 29
Studies Altitude Flow 44
Forms Complex Contours 47

CHEMISTRY, METALLURGY

More Isotopes for Export 47
Water Boom for Flourides . . . 57
Chemical Substitute for Ice . . 59

CONSTRUCTION

Road Group Aids Point 4 26
Cuts Costs for Warehouse . . . 34
Augur Drills Footing Holes . . . 48

ELECTRICITY, POWER

Modern Distribution System . . 31
Lights Guide Boiler Operation . 46
New System Operating Maps . 59

ELECTRONICS

Solders By Ultrasonics 37
Radio-Controlled Lifeboat . . . 39
Another New Transistor 52

FOOD PROCESSING

New Food Equipment 27
Takes Bread Temperature 31
Superior Animal Shortening . . 51

MECHANICAL DESIGN

Prevents Exhaust Corrosion . . . 30
Mandrel Expands Like Collet . 53
Spark-Shielded Fork Truck . . . 54

METALWORKING

Unusual Machine Tools 21
Speeds Cold Working of Steel . 27
Metalworking Shorts 50

MINING, PETROLEUM

Deepwell-Turbine Pumping . . 26
Pillar Soaking Reduces Dust . . 48
Sorting and Washing Plant . . 57

PLANT MANAGEMENT

New Jobs for Tapes 41
Cut Bridge-Crane Accidents . . 51
Intercoms Handle Timecards . . 60

TEXTILES

Clearer-Waste Slubs 24
Long Print-Roll Brush Life 27
Weaves Waterproof Fabrics . . 41

TRANSPORTATION

New Snow-Fighting Unit 31
One-Car Train Makes Profit . . 34
Rough-Road Testing Unit 41

187 Items in This Issue

John F. Chapman — *Publisher*
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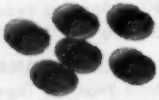

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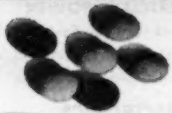

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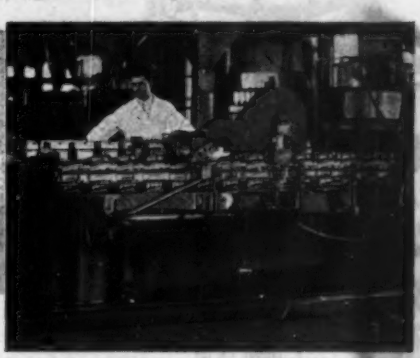

NEVERSTOP machines bottom seal, fill, and top seal up to 200 cartons per minute.

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FMC's broad range of division built products is described in Booklet No. E-108, sent on request.

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		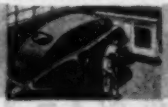	

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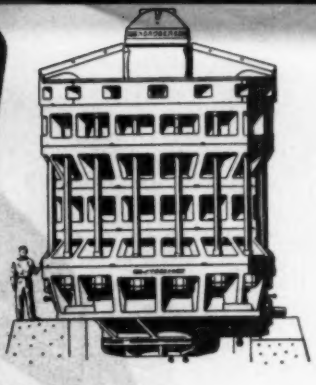

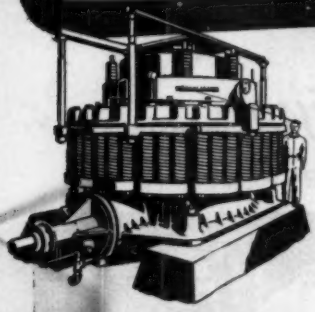

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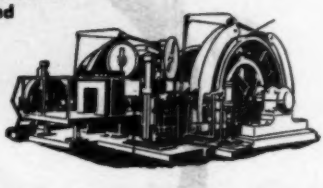

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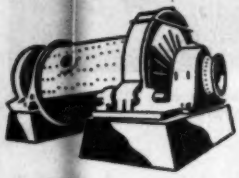

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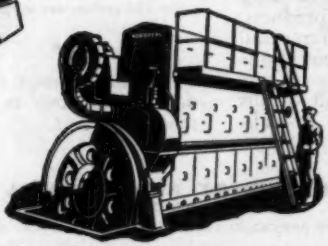

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BUSINESS TRENDS

U. S. OUTLOOK is for renewed inflation—not abrupt inflation, but a steady upward pressure on prices.

Return to inflation follows a lull that lasted all summer. Commodity price averages declined slightly, with a few falling sharply. Cotton dropped almost 25% in less than 2 months, wool went far below its post-Korea peak, and the Reconstruction Finance Corp. pushed tin down to $1.03 a pound. Most retail prices were fairly steady, although the cost of living set new records almost every month. Increases were slight, and price cutting was marked in some lines, conspicuously television sets and clothing.

Slow-up in inflation had lots of causes: consumer resistance to high prices, credit controls on consumer buying, over-production in some lines, the fact that some prices—wool, for instance—were boosted too high after Korea. But all these conditions have about worked themselves out. Over-produced industries cut output during the summer. Out-of-line prices were corrected.

Consumer buying should increase for the next several months. Buying always rises in the fall. And U. S. consumers have plenty of money and will soon have even more—personal incomes ran at an annual rate of $251- to $252-billion during the summer, should be approaching $260-billion by December. When Americans have lots of money, they always spend it, sooner or later. Congress gave demand an extra push by easing credit rules for consumer goods.

The defense program will keep adding fuel to inflation by building government deficits and creating greater shortages of raw materials for civilian goods. The annual rate of spending for defense, about $40-billion in the summer, is now scheduled to reach $50- to $55-billion by year's end, and $60- to $65-billion by the middle of 1952.

Future international developments probably will determine the exact degree of the new inflation. Bad news would mean an abrupt rise, good news a slackening—though probably not an actual deflation. An unchanged international picture would mean a slow but steady rise in prices.

DEFENSE PROGRAM in the U. S. is being held up by the increasing complexity of modern weapons. Washington is finding that setting up production lines is much harder now than it was in World War II.

Airplanes show the problem. New planes take more time to design, more time to build, and require more complex parts than old planes. An example: about 42,000 hours of engineering work went into the first P-51, a top World War II fighter, before it got off the ground. But a new, all-weather jet will require an estimated 1,131,992 engineering hours, about 27 times as many. The new

plane weighs about one-and-a-half times as much as the P-51, takes correspondingly longer to build.

Big, expensive tools are needed to turn out parts for the new planes, and that holds up production further. The addition of jet engines and radar makes tremendous new problems for production men. Electronic equipment alone for a new night fighter costs as much as an entire fighter in World War II.

Indecision has also delayed the military program. First the generals could not decide which new weapons to put into mass production. Then they kept making minor changes in design; this caused further delays for expensive retooling. But more attention is now being paid to production problems.

DURABLE-GOODS DEMAND is as heavy as ever in the U. S. Output of heavy equipment of all kinds is running far behind orders. Result: delivery dates stretch far into the future, and few orders are filled without priorities. Here are the prospects for orders from abroad:

Farm machinery—Demand from abroad is quite heavy. Deliveries now take from 6 to 8 months.

Electrical equipment—Everything is short, motors most of all. Deliveries take in the neighborhood of 35 weeks. There are many domestic priority orders, but few priority orders from abroad. As a result, a larger-than-normal percentage of production is staying here.

Industrial equipment—All kinds are tight, but not so much as some other types of equipment.

Mining equipment—Most is available in 3 to 4 months, but it goes mainly on priority, and there still are not many priority orders for export.

Industrial sewing machines—Some models take up to 2 years for delivery.

Steel Products—Everything comes under the Controlled Materials Plan. Buyers abroad may get priorities if they need the steel for defense work.

Insecticides—Output has increased, and shortages are being filled. DDT and chlordane are plentiful; benzene hexachloride is in fair supply. One still short: copper sulfate.

Textiles—The industry over-produced, and consumers stopped buying at home. Result was a big surplus and a marked weakness in prices. The trade expects improved domestic sales from now on. But lots of textiles will still be available to fill any domestic and export demand.

Radios—Another case of high production and relatively low demand. The story is the same as that of television receivers.

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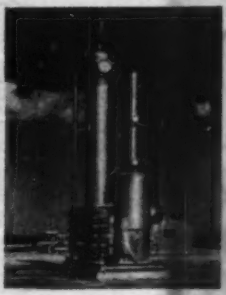

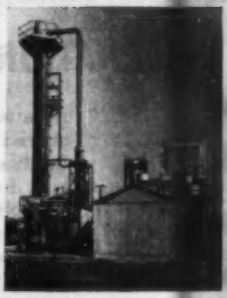

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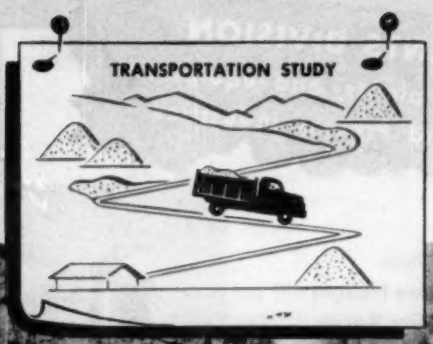

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INTERNATIONAL

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WASHINGTON REPORT

LOOK FOR RUSSIA to make a major shift soon in her tactics. Washington's top Russian experts think that the Kremlin is now getting scared by the Western military buildup and by continuing Western unity; that it has learned that it cannot stop the West by propaganda and veiled threats.

So Stalin is figuring out a new tack. He may try to relax world tension by a real peace offensive. Or he may get tough and try to force a showdown with the West even at the risk of war. Either way his game would be to tempt or scare U. S. allies toward neutrality.

Stalin will vote for the peace offensive. The experts are betting on this because they are convinced that he does not want war now. His target probably will be disarmament. This has more propaganda appeal, demands fewer concessions from Russia than territorial concessions.

But the experts believe too that danger of world war never has been greater. They fear that the Kremlin will misjudge popular impatience in the U. S. with the indecisions of the cold war and that the Kremlin will blunder into a world conflict. This could happen easily in Korea. Resumed fighting in Korea would produce tremendous popular pressure in the U. S. for all-out retaliation against China, including bombing of Manchuria. And the experts agree that Russia would be practically sure to come in then.

You will probably know by the time of the UN General Assembly meeting in Paris this fall which way the Russian bear is going to turn.

U. S. STOCKPILE will grab for a lot more raw materials in the world market this year than it did last. Jess Larson's new Defense Materials Procurement Agency has orders to boost U. S. commitments for purchases of strategic materials to $1.5-billion worth this year. Actual delivery purchases will top $1-billion worth. Purchases last year totalled only about $700-million. About 75% of all stockpile funds is now being spent abroad. Larson will use subsidies to bring foreign raw materials into the U. S. market under the price ceilings.

Reason for the new drive to import foreign strategic materials is that the stockpile is lagging badly behind its target. It was supposed to have $8.3-billion worth of strategic materials stored away by June this year, but had only $3-billion worth on hand. And U. S. production is falling steadily behind consumption in 25 out of 38 key materials needed for the military buildup. These include iron ore, copper, bauxite, zinc, lead, tungsten, mercury, manganese, chromite, molybdenum, nickel.

Larson's agency also will fight shoulder-to-shoulder with Export-Import Bank and ECA to boost foreign production of scarce strategic materials. Ex-Im Bank

WASHINGTON REPORT (Continued)

is asking for a $1-billion boost in its lending authority, a good slice of which would be earmarked for strategic-materials developments.

U. S. BUSINESS will get a star role in ECA's new drive to boost European productivity. ECA plans to act as liaison agent to put American companies into direct contact with European companies needing technical or financial assistance.

ECA will encourage and facilitate licensing agreements, providing for technical assistance as well as blueprints, long-term technical-assistance contracts, agreements for the extension of credit by American companies for the purchase of U. S. equipment, and American private purchases of stock in European companies. The same sort of program will be undertaken on a smaller scale in other parts of the world where ECA operates.

Key objective of the program is to alleviate or bypass the acute shortage abroad of private development capital by tapping the initiative, know-how, and financial resources of American business directly, instead of through government middlemen.

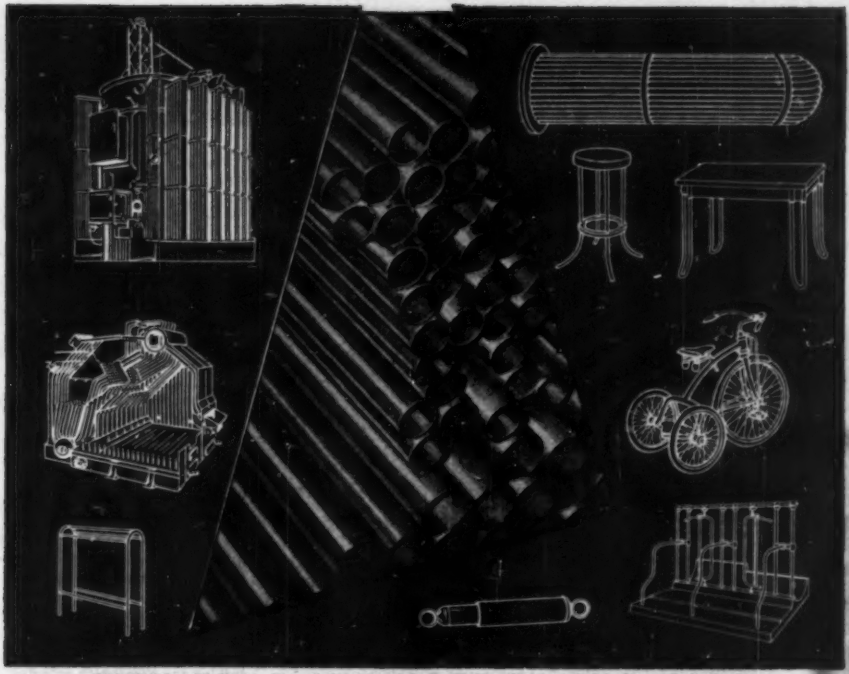
IMPORT AND EXPORT QUOTAS, not profit prospects, are the biggest barrier to U. S. private investment abroad, according to a survey made recently by the National Industrial Conference Board, New York. Other bars to American foreign investment in order of importance are restrictions on profit remittances, capital-movement controls, foreign social-security legislation, double taxation.

World Bank will soon make two new departures in its lending practice. It will make the first of a series of loans to help Italy finance its 10-year $1.6-billion development program for southern Italy.

Unique feature of the first loan will be that it will purchase consumer goods and finance housing to parry the inflation expected to result from the program. Bank in the past made only heavy capital development loans.

Another first for the World Bank will be its first loans soon to be made to private industry in Latin America. One will go to Chile to re-equip two privately owned coal mines. Another will go to a private chemical plant in Brazil.

World Bank credits to organizations set up to make local development loans to small enterprises are paying off. The Turkish Development Bank, set up with World Bank help, has made half a dozen loans already. The Ethiopian Government Development Organization, also sponsored by the bank, is getting set to make several loans. And the group of Mexican banks that jointly received a $10-million World Bank credit for local financing operations just made its first loans—one to a gunny-sack company and another to a kitchen-stove plant. Cuba and Colombia are working on similar local lending agencies.



WHY MORE AND MORE TUBING MADE *"The Yoder Way"* GOES INTO THINGS DESIGNED TO STAY

Since Yoder in 1939 introduced their first electric-weld tube mills, high quality tubing at low cost has become available in quantities heretofore undreamed of.

The relatively low first cost of these mills, compactness, simplicity of operation and high production, virtually created a new industry, specializing in making fine tubing and making fine things from tubing.

Thousands of manufacturers of automotive equipment, household appliances, home and business furniture, farm equipment, bicycles, garden tools, boiler tubes, electric conduit, etc., have found in this tubing a ready means of making their products lighter and more attractive in appearance, yet stronger and longer lasting.

As a result, the demand for tubing has increased faster than the supply, so that tube-making "the Yoder way" today, more than ever, offers attractive rewards to private enterprise.

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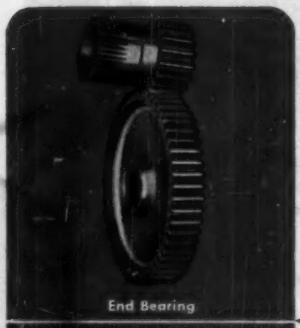
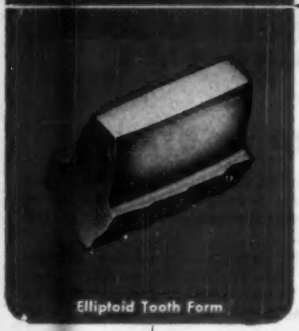
BASIC FACTS ON GEAR TOOTH CROWNING



End Bearing



Elliptoid Tooth Form

Q. *Why are gear teeth given the Elliptoid tooth form or crowned?*

A. To PREVENT "end bearing" in service.

Q. *What is "end bearing?"*

A. A concentration of load at the end of the tooth due to end contact between teeth rather than its distribution along the entire tooth face—the condition for which the tooth was designed.

Q. *Why is "end bearing" objectionable?*

A. Because it imposes concentrated stresses beyond the fatigue strength of the material at the contact point which may lead to premature failure. It is also an important cause of noisy gear operation.

Q. *What is gear tooth crowning?*

A. A calculated elliptical reduction in tooth thickness from the point of maximum crown (usually the center) toward both ends. Normally it amounts to .0003" per inch of face width per side, but this is optional depending on service conditions.

Q. *Can "end bearing" be avoided by any other method?*

A. No. Because

1. It is practically impossible to assure perfect alignment under all conditions of loading due to unavoidable deflections in shafts, bearings and the mountings, all of which are elastic.
2. It is also impracticable to avoid all fire distortion in hardening gears which have been machined previously.

Q. *How are gear teeth crowned?*

A. On Red Ring Shaving Machines.

Q. *Can the amount of crown be controlled accurately?*

A. Positively. Such a large number of leading automotive gear plants would not be using it otherwise.

Crowning is controlled on the Model GCI Shaving Machine by locking the cam which actuates the table movement at the desired point. Models GCU and GCV use formed cutters ground precisely to the amount of crown required. No variation is possible without changing cutters.

In a random check of 4000, 1" face gears the maximum variation in the amount of crown was within the specified tolerance of .0002".

Write for
BULLETIN 549-5
for a more detailed discussion of gear tooth crowning.

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October 1951 • McGraw-Hill DIGEST • Volume 6 Number 10

Help for Foreign Development

A new committee has been set up within the American defense agencies to help vital foreign development projects get the materials they need

THE UNITED STATES finally is taking vigorous action to make sure that major foreign development projects get the American equipment and materials needed to get them underway.

The new Foreign Facilities Committee, just set up to do this job, already has approved three foreign projects for top priority assistance. It is ploughing ahead into a $300-million backlog of major foreign orders that have been piling up in the back of U. S. manufacturers' order books since the outbreak of the Korean war.

The FFC is more than a safety valve for riding out the current materials shortage. It plugs a gaping hole in the execution of U. S. economic foreign policy.

Up until now, there has been no effective machinery for bridging the gap between the financing of foreign development projects—through the ECA, the development banks, and private channels—and the actual deliveries of scarce U. S. goods essential to carrying out the projects. The FFC will be this bridge.

What Else FFC Will Do

It also will set important economic foreign-policy precedents. Its long-range job will be to integrate foreign equipment needs into the over-all picture of the free world's defense effort. The goal: more efficient utilization of the free world's resources.

The committee, in the course of its work, will have to make judgments like this: Is an irrigation project in Southeast Asia more important to the defense of the free world than a road in Nebraska or a few extra bombers for the Air Force?

How Projects Will Be Picked

Making such decisions will mean weighing such things as the amounts of specific materials involved relative to supply; whether the foreign country is politically, economically, and technically strong enough to follow through on the project; whether the project will pay off soon enough to justify undertaking it in an emergency period like the present; what economic and political advantages the country will reap in terms of a higher standard of living and resulting increased political stability; what economic and political dividends the U. S. will get in strategic materials and firmer political orientation of the foreign country toward the free world.

A look at the first three projects approved by the FFC gives a good idea of its importance to the security of the U. S. and the stability of our allies. It also shows what relatively small amounts of U. S. goods are needed to get most foreign projects rolling. But that small amount in every case is indispensable because it usually consists of heavy specialized equipment or scarce specialized materials that can be found only in the U. S.

1. A Mexican Gulf sulfur plant near San Cristobal, Veracruz, Mexico, will produce 99.65% pure sulfur from two new domes. It is estimated that these

domes contain 1.5-million long tons of pure sulfur. And Mexican Gulf has prospected so far only 125 acres of its 1,500-acre concession. There may be more sulfur still in the ground.

The Export-Import Bank has given the company a $1,875,000 credit to buy U. S. equipment. Total cost of the project will be $2.5-million. The company has put up an initial $836,000. The plant will use the Frasch system of mining.

Here are some of the materials and equipment that will be needed from the U. S.: steel buildings, high-pressure boilers, compressors, centrifugal pumps, low-pressure turbine generators, steel and galvanized piping, asbestos, drilling rigs, construction machinery, structural steel.

The International General Electric Company has the contracts to supply most of the electrical equipment; Babcock & Wilcox will supply boilers and boiler equipment.

What Equipment Is Needed

The quantities of the major types of goods needed are as follows: steel-mill products—$959,000; saw-mill products—$17,000; electrical equipment—$300,000; engines and turbines—$184,000; construction machinery—$403,000; mining equipment—$184,000; machine tools—$118,000; vehicles—$313,000.

The extra sulfur that will be turned out by the plant is desperately needed by all the NATO nations. And the project will be a windfall for Mexico too. Mexico now imports large quantities of sulfur and loses $25 per ton of foreign exchange in the process. The Mexican Gulf development will make Mexico virtually independent of foreign sulfur sources.

2. A Thailand irrigation project, made possible by a $58-million credit from the World Bank, will take 6 years to complete. Only $18-million of the total will be needed for foreign materials and equipment and only a few million of that must be purchased in the U. S. But Thailand cannot start scheduled construction until it is sure of getting the U. S. indispensable construction equipment, like heavy draglines and bulldozers.

Irrigation and Transportation

The project consists of building an Emerson dam and a network of canals along the Chao Phya River. This will assure year-around control of the water supply of Central Thailand and facilitate water transportation along the 5,000 miles of canals that are the country's principal transportation arteries. The project involves moving 60-million cubic meters of earth. Plenty of heavy construction equipment is needed.

But there will be a rich payoff. Thailand's rice production will be boosted 546,000 tons per year when the project is completed.

This will help the whole of South East Asia. This area has always been short of food; it is practically "a famine area since civil unrest cut rice exports from Burma, Indochina, and Korea to a trickle. The population of the area has jumped sharply since prewar. Its rice production has fallen about 3%.

Thailand's rice paddies, in the past, have been at the mercy of drought. A recent study showed that the central rice fields suffered from severe drought during 66 of the past 118 years. So, some form of water conservation will have to be developed.

Drugs for Argentina

3. An Armour & Co. plant in Argentina will make acthar, insulin, tryptar, and thyroid extract. The world shortage of these products has been growing steadily since 1942. World consumption of insulin, for example, doubles every six years.

The new Argentinian plant will turn

out 4-billion units of insulin per year. Argentina will get 20% of this for home consumption, the U. S. will get the rest.

Choice of the site was dictated by the fact that Argentina is a rich source of the animal glands used in manufacturing these products. There is an export ban on these glands; they would be expensive to export even if there were not.

Armour already has obtained a plant. It needs $189,972 worth of laboratory equipment and $81,970 worth of Moyno pumps, spring filter presses, and other processing equipment. The major scarce material involved in this equipment will be about 22,000 lb. of stainless steel.

The FFC is set up within the National Production Authority. It groups representatives of the ECA, Commerce Dept., State Dept., Ex-Im Bank, Interior Dept., Agriculture Dept., the Defense Production Administration, the Munitions Board, and the NPA. Chairman of the committee is the director of the Foreign Division of the Policy Coordination Bureau of NPA.

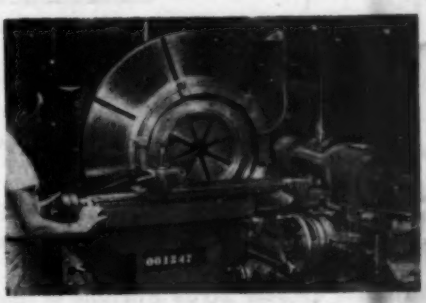
Requirements for Assistance

Only major foreign development projects that are sufficiently unified that they must get delivery of all needed equipment and material on schedule in order to meet construction and erection schedules and so unified that the whole project must be completed before it can start producing are considered by the committee. Projects that do not meet these two requirements will not be considered under present conditions of material scarcity.

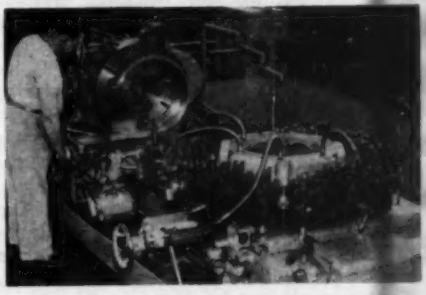
Approval of a foreign development project for priority assistance means the foreign buyer will get the same assistance, in the form of allocations and priorities, from all the agencies of the government in getting his order filled as the domestic defense producer does.

Unusual Machine Tools

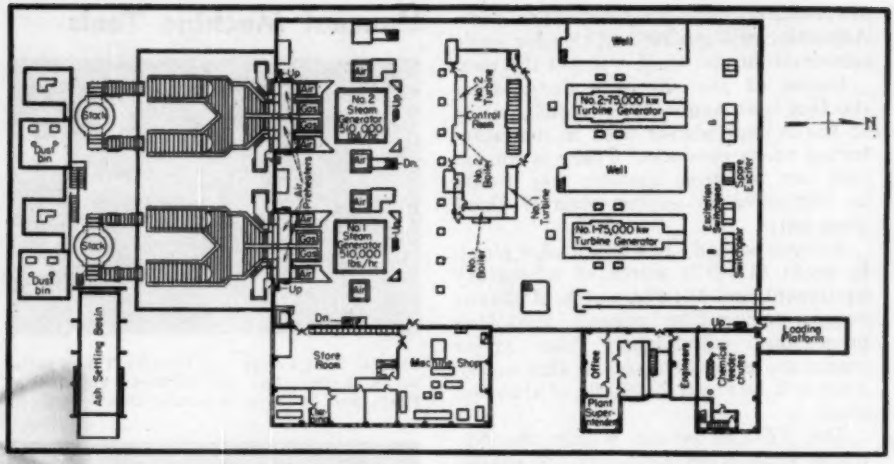
Special built Lodge and Shipley T-bed lathe turns large rings for turbojet engines at Pratt and Whitney Aircraft Div.



Combination lathe-grinder was made for dual operation by mounting a Monarch turning slide on bed of Heald grinder.



Ten-position turret lathe was built by Jones & Lamson for machining turbine and compressor disks.—Am Mach, Aug 6, p99



***PLANT LAYOUT** of Titus Station shows how a lateral rather than a vertical disposition of the functional parts of the plant was permitted by land being readily available at the site*

Modern Power-Plant Design

New power plant features use of relatively new materials plus some other novel ideas, such as using sootblowing air for hogging ejector

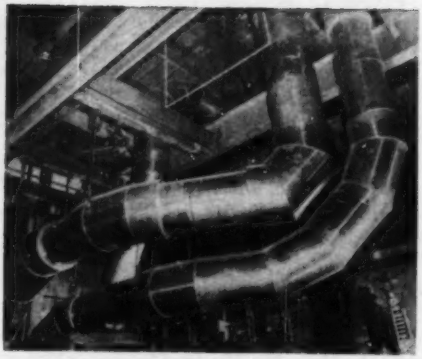
DESIGN OF THE TITUS STATION of the Metropolitan Edison Co. at Reading, Pa., included several outstanding features—an extensive use of aluminum, soot blowing air for hogging ejector, retention of stop valve, cooling-water treatment.

Plant boiler capacity is 510,000 lb. per hr. at 1,475 psig. and 1010° F. with reheat from 407 psig. and 710° F. to 383 psig. and 1010° F. The sixteen tangential burners can be tilted to regulate heat absorption by the wall tubes. Spray desuperheaters compensate for excess temperatures and are available in emergencies if a feedwater heater is lost or water walls are encrusted. Turbines are tandem reverse-flow type.

Aluminum Siding—Building siding is made up of C panels. They are 16 in. wide by 8 ft. long units enclosed on all sides by aluminum sheets and packed with 3 in. of glass wool for insulation. C panels were selected because of low installed cost, neat appearance, high insulating value, low maintenance cost, and ease of erection.

Aluminum Insulation—All power piping, ducts, breeching, tanks, heaters, evaporators, soot hoppers, and other such equipment are covered with reflective insulation. It is fabricated in sections and built up of layers of aluminum-alloy sheets and dead-air spaces. A nonconductive spacer material at the edges of each section seals dead-air spaces.

Insulating efficiency is higher than that of 85% magnesia. Other advantages are low cost, fire-proof qual-



REFLECTIVE-TYPE insulation consists of aluminum-alloy sheets and dead-air spaces

ity, ease of removal for maintenance work, and elimination of painting.

Hogging-Ejector Air — Compressed air from sootblowing air receivers at 500 psig. supplies the hogging ejector. This arrangement allows the condenser vacuum to be built up before boiler pressure reaches 300 psig.—the steam pressure normally required for the ejector.

Benefits are (1) a shorter over-all start-up time, (2) a shorter period during which the steam generator is fired with no flow through the reheater, and (3) lower make-up requirements because of minimizing the period that superheater vents are open and eliminating the steam losses through the ejector.

Stop Valve—A motor-operated stop valve was installed in the superheated steam line. It permitted (1) hydrostatic testing and boiling out of boiler and superheater prior to installation of the turbine stop valve and (2) blowing out the main steam lead and the reheater and its leads. Installation of the valve was counter to the developing trend of omitting it.

Cooling-Water Treatment—Because of the turbidity of the available river water, all cooling water is clarified in two 2,100-gpm. water precipators before it is fed to turbine-oil coolers, hydraulic-coupling-oil coolers, compressor cooling jackets, and similar equipment. Make-up water is treated in gravity-type filters and automatic Zeolite softeners.

Chemicals are stored in a room just off the loading platform. The room is located over the laboratories, which in turn are immediately above the water-treating equipment. This arrangement reduces handling as chemicals can be delivered by chutes directly to the dry feeders.

Trenched Power Runs—Cables are armored and laid in trenches in the basement floor. Trenches are covered with metal plates. Short runs of conduit carry cables to individual pieces of equipment.—Elec World, July 30, p78

"Cold Welding" Saves Engine

The little practiced technique of cold welding (actually not welding at all but mechanical stitching) can be used to repair cracks in engines.

Four sizes of rod with the same number of taps, dies, and drills, an assortment of chisels, and the regular assortment of hand tools are all that are necessary.

Ends of each crack must be drilled to prevent further development of the crack. A channel the width of the rod used is cut with a chisel. The drilled holes are tapped and rods are screwed into them and cut off.

Each crack is drilled and tapped at specified spacing for its entire length and rod is screwed into it in such a manner that each stud interlocks with the one next to it. Each stud is peened at the surface.

A sealing compound is circulated through the cooling system to insure a tight seal. The repair if properly done will not leak even if the compound is not used.—Fleet Owner, July, p74

Bronze Electrodes Weld Similar, Dissimilar Metals

Bronze electrodes are versatile performers in joining metals and for overlays. In joining, they weld both similar and dissimilar metals and alloys.

In dissimilar metal welding, they produce a braze-welded bond with iron-base or nickel-base alloys and a weld bond with copper-base alloys. All copper-alloy electrode deposits flow freely in the iron- or nickel-base metals. In matching plate materials, deposits flow sluggishly but may be given better flow characteristics by:

1. Using wide grooves with 60–90° V or modified U design.
2. Preheating and maintaining fairly high interpass temperatures. General rule: preheat to 300° F. for iron-base metals, 400° F. for bronzes (except silicon bronze), 500-800° F. for brasses, and 800° F. or higher for copper.
3. Controlling welding current. Use low side for welding iron- or nickel-base alloys, middle of range for bronzes, high side for copper and brasses.—Weld Eng, July, p20

Clearer-Waste Slubs

Fabric slubs can be caused by clearer waste getting into the yarn. Here are some corrective measures that will eliminate or reduce slubs.

- All clearer picking in the card room should be done only on the doff or with the frame stopped.
- The roll surface should exert enough friction on the fibers to carry waste well up into the clearer and prevent eyebrows.
- Clearers should be kept in good condition and with the front edge extending beyond the center of the top roll.
- Clearer cloth should be turned at regular intervals to present a new napped surface to the top-roll. Clearers should be brushed after picking. A fairly stiff brush is recommended.—Textile World, July, p111

How To Move Machines Fast

Higher production demands may mean a new plant layout. Moving machines may sound like a tough job, but properly planned it can be done with little time lost. Here is how Pratt & Whitney Aircraft goes about it:

First, a "move meeting" is called. Machines to be moved are considered by groups. A logical order for moving is set up, taking into account production problems.

Second, the millwrights make a "rotation list" with the exact sequence in which the individual machines will be moved.

Third, the new location is fully prepared. All necessary utilities are ready for the machine and any special preparations, such as beds or pits, have been made.

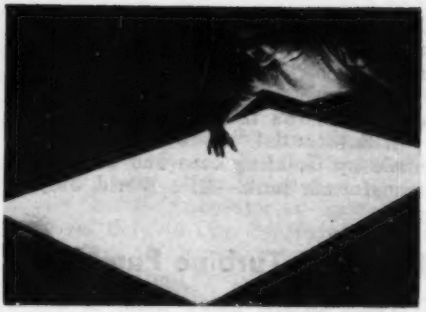
Before the actual moving is begun, the floor in the new area is marked to show the exact spot for each machine. When the move begins, the machine operator removes the piece he is working on. Both machine and work are labeled. As soon as the machine is put in place at its new location and tied in to the utilities, the work-in-process is put back on the machine.—Factory, Aug, p94

What Color To Paint . . .

. . . your products is an important decision—one that affects their sales and use. Maybe you pick, say green, for your new power saw or diesel engine or textile machine. "because that's your wife's favorite color." Maybe green is the right color—but why not find out? How To Plan Product Colors on p61 reports to management on modern color engineering. As usual, further information is available.

Glass Panel That Glows

Electroluminescence, developed by Sylvania Electric Products, Inc., (McG-H Digest, Dec '50, p37), is finding commercial use, such as the luminous ceiling on the front cover. Panelite has phosphor dielectric between metallic coating and conductive glass.—Elec Whols, Aug, p80



LUMINOUS SHEET illustrates intensity of electroluminescence. Panelite glows when placed in fluctuating a-c. field.

SELF-LIGHTED SIGN glows brightly when hooked to a-c. circuit. Entire two-sided sign is about ¼ in. thick.

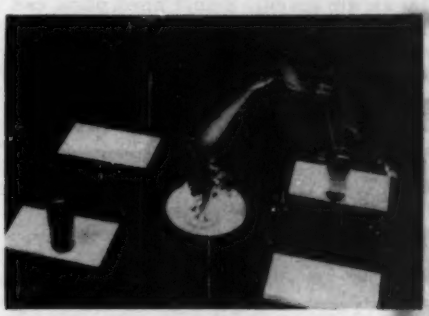
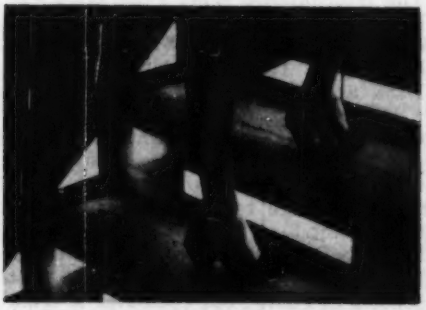


TABLE-TOP LIGHTING gives a novel effect with Panelite. No bulbs are in the way under the ⅛-in. thick sheets.



STAIRCASE has thin strips of Panelite built into both risers and sides of steps. Light is down where it is needed most.

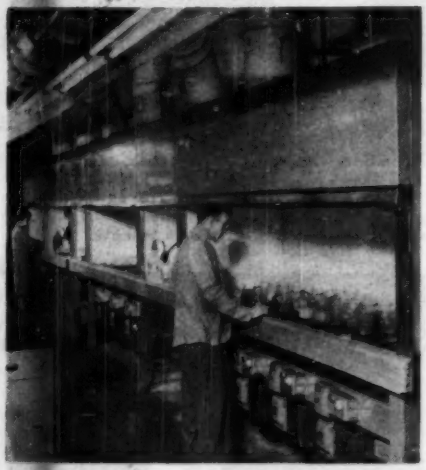
GLOWING SWITCHPLATE, permanently connected to house wiring, uses only 1/50 w. and needs no auxiliary equipment.

Acoustic Panels Promise Transformer-Noise Relief

Investigation by Portland General Electric Co. of transformer-noise distribution, various types of sound barriers, and the effect of modifications of internal structure indicate that:

1. Acoustic panels built with a resonant cavity to form an acoustic filter (Helmholtz resonator) promise good results with minimum interference with ventilation. Such a panel is made of a perforated transite front panel and a solid impervious back panel, separated by an air space. Sound absorption can be broadened by filling the air space with porous material such as fiber glass or rock wool.

2. Noise level at nearest dwelling can be reduced by orienting the transformer.



HOOD IS GLASS-LINED

New laboratory hood installed at Pratt & Whitney Aircraft Div., United Aircraft Corp., has a water spray in exhaust system to trap acid fumes and keep interior piping free of deposit. Hood is lined with glass to prevent absorption of perchlorates.—Chem Wk, July 28, p14

Equal noise level curves show that radiators, for instance, dampen the noise.

3. Noise level decrease with distance closely follows theoretical values.

4. Substantial improvement can be made by isolating core and coils from transformer tank.—Elec World, July 2, p72

Deepwell-Turbine Pumping

Vertical-turbine pump units in mines offer these advantages over the horizontal split-case pump:

1. Less floor space is required in an underground station.

2. No priming equipment is needed. The pump element is submerged.

3. Horsepower curve is flatter; smaller motors can be used.

4. As abrasive wear occurs, the turbine-type pump can be easily adjusted to reduce wearing clearances in the pump bowls without disassembling.

Control of the pump from ground level facilitates operation after the normal day shift on an "off-peak-load" basis. Power costs are thereby decreased.—Coal Age, July, p83

Road Group Aids Point 4

The International Road Federation will help the U. S., under Point Four, to develop technical know-how for road building in Latin America, the Near East, and Southern Asia.

IRF will do three things: (1) make on-the-ground surveys in the three areas of the world to find out what technical information is needed there for long-range road development; (2) start Point-Four fellowships for foreign highway engineers to study in U. S. universities; and (3) establish two pilot schools in Point-Four countries to train operators and mechanics on highway and farm equipment.—Eng News-Rec, July 26, p29

Novel Spice-Oil Filler Among New Food Equipment

Products and machinery displayed at the Institute of Food Technologists' recent convention included:

• Griffith Laboratories' new line of Royal Soluble Dry Seasonings, a combination of oleoresins and natural extractives from spices with essential oils, was developed for manufacturers of sausages, sauces, soups, stews, catchup, and mayonnaise.

• New uses for Atlas Powder Co.'s monostearates and its moisture-conditioning agent, Sorbitol, were reported. Being made for the armed forces is a coconut-cream bar in which the center candy contains 15% Sorbitol and the coating 1% of monostearates.

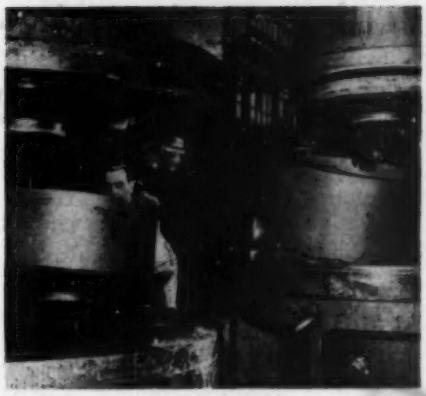
• Food Machinery & Chemical Corp. featured a pilot sterilizer. It consists of a cylindrical chamber with motor-driven reel to rotate cans. The canner is able to simulate actual processing conditions in commercial-size cooker.

• A device, manufactured by C. W. Logeman Co., adds a carefully measured quantity of spice oils into individual jars on the processing line. Uses will include adding spice-oil mixture to pickle jars.—Food Eng, Aug, p87

Long Print-Roll Brush Life

The Manhattan Print Works found it could extend print-roll furnisher-brush life when it changed from tampico brushes to furnisher brushes having a metal core and nylon bristle.

The new brush combines the advantage of lightweight, strength, and a firm bristle surface that presses evenly from end to end of the brush. A minimum of pressure is required to hold the brush in contact with the print roll; there is no tendency for unsupported bristle ends to bend or snap off.—Textile World, Aug, p102



Production of washing-machine tubs is two-draw job with the . . .

Phosphate Coat that Speeds Cold Working of Steel

Foscoat metal-treating method consists of cleaning, pickling, and phosphate coating combined with a specially developed lubricant. The surface produced is not removed even under the most severe drawing operations.

Applications include drawing, stamping, wire drawing, tube drawing, and cold extrusion. Advantages include elimination of intermediate press operations, annealing, and chemical treatment; lower consumption of chemicals; reduced scrap loss.

The complete process consists of pickling and cleaning with compatible Fosclean products, immersing or spraying with Foscoat, and soaking briefly in Foslube. Products are marketed by Pennsylvania Salt Mfg. Co.

The process was developed jointly by Pennsalt and Heintz Mfg. Co. for cold extrusion of steel (McG H Digest, Oct '49, p22). In wire drawing, wire can be fed to header without further lubrication; die life is improved.—Am Mach, July 23, p174

Industrial Color Matcher

Flicker-photometer type instrument with multiplier phototube surpasses human-eye sensitivity in matching even dark colors

DETECTING COLOR DIFFERENCES is a job that must be done in many industries—as, for example, in matching plastic, textile and dye colors.

One requirement of a colorimeter is that it detect small differences in the darker colors quickly, reliably, and with a sensitivity beyond that of the human eye. A second requirement is that the instrument be rugged, stable, and simple enough in operation to serve as a production tool.

To meet these requirements, the Instrument Development Laboratories, Inc., developed a flicker-photometer type instrument that measures on a three-color basis known as tristimulus colorimetry. Color to be matched or evaluated is viewed by a phototube through blue, green and amber glass in turn. A meter indicates percent difference between sample and standard for each color.

Sample and standard are viewed alternately 30 times per second. Light source within the integrating sphere is incandescent. Optical parts include four lens elements, field stops, stray-light stops, source filters, tristimulus filters, and a multiplier phototube.

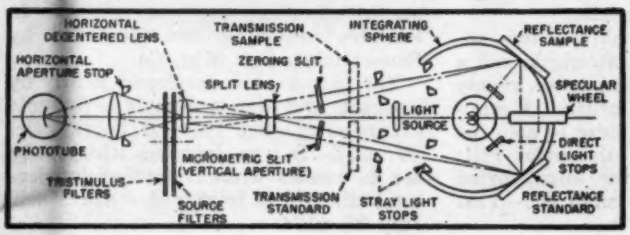
Either transmission or reflectance measurements can be made on any commercial color. Transmission measurements of liquids or transparent solids are made by placing a sample and a standard against the sphere.

When light reaches the phototube, the light consists of (1) a steady component representing mean brightness of sample and standard and (2) a flicker component of magnitude representing the difference in brightness of sample and standard.

If the reflected or transmitted lights from sample and standard are identical, phototube output is unchanged by the flicker. If the two differ, an alternating current is generated in the tube circuit.

To assure measurements truly based on color, the instrument computes the ratio of sample to standard brightness and indicates it on a meter. The meter has a full-scale range of 91% to 110% (corresponding to +10% or—9% in relative brightness). A less sensitive range covers 70-145% ratios.

Also, a direct reading micrometric slit permits evaluation of colors relative to white or colored reference standards. Comparison is on a tristimulus basis. Reflectances or transmissions as low as 0.1% can be measured.—Electronics, Aug, p102



***OPTICAL SYSTEM** of electronic color matcher is shown telescoped for compactness. A rotating decentered lens allows multiplier phototube to view sample and standard alternately 30 times per sec. Small a-c. motor drives decentered lens.*

Diesel Fuel Nears Peak—Quality Expected to Fall

Diesel fuel use has increased in the last 15 years. But taking more products from each barrel of crude oil means less diesel oil in the future. In the effort to get more yield out of a barrel of crude, diesel fuel quality will drop. A big drop in quality will make for difficult starting in cold weather, smoky burning, and engine roughness. That means higher maintenance costs. A new diesel fuel additive may help, but it is expensive.

In the long run inferior fuel may not be a handicap. The trend in diesel engine design is to make engines less sensitive to fuel.

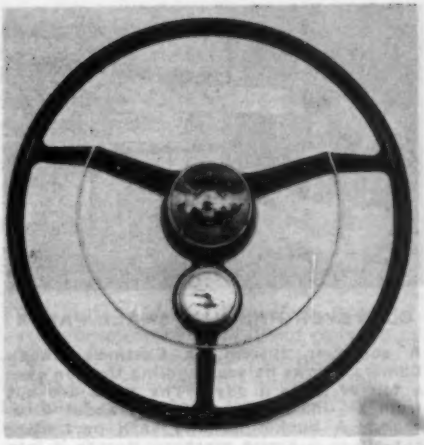
Less sensitive diesels will not compensate for higher sulfur content in fuels, however. Sulfur produces greater engine wear and deposit formation. It is possible to process this sulfur out of the fuel, but prohibitively expensive. So diesel operators will have to turn to improved lubricating oils to compensate. By adding a high proportion of detergents to lubricating oil, damaging effects of sulfur can be neutralized.—Business Wk, July 28, p90

Frame Pierced for Piping

Designers of a new chemical plant for Hoffman-LaRoche, Inc., solved the problem of passing piping through the floor in a novel way: horizontal concrete struts are forked at their ends to receive acid-waste sinks and stocks.

This solution was less costly than double members with sinks and piping fitted between. Saving is mostly in formwork.

Forked concrete struts are 16 x 16 in. in section, with ends spread 16 in. apart. Serving as column bracing, they carry only wind loads.—Eng News-Rec, Aug 23, p39



WATCH ON THE WHEEL

Mounted on the steering wheel, Oldsmobile's new 15-jewel car watch has a Swiss movement. Turning of the steering wheel and normal car movement wind the watch's movement. The watch is optional at extra cost on all 1951 Oldsmobile models.—Auto Ind, Aug 15, p19

Ceramic Liners Boost Life

Solar Aircraft Co. has developed a new ceramic-coating process expected to increase life expectancy of jet-engine parts. Common metals substituted for scarce alloys will also get a boost from the new coating.

Advantages of the coating include: (1) protection against oxidation, (2) reduction of hot spots, cracking, and warping, (3) improved metal fatigue properties, (4) higher temperature use, (5) stabilization of metal surfaces, and (6) thinness combined with strength.

The company says that its coating is thinner than other ceramic coatings, that it can be heated or cooled rapidly without cracking or flaking, and in some applications expands and contracts with the metal.—Aviation Wk, Aug 13, p34

CONVEYOR HANDLES SMALL PARTS

A conveyor system at Eastman Kodak Camera Works halves handling time on over a ton of parts a day. The parts are cut from 1½-in. brass rod, weigh about 4 oz. each. A bucket catches each part after cut-off on a screw machine, dumps it into a short gravity chute to cleated elevating belt. This belt lifts parts, sets them flat on 8-in. belt overhead. Tripping device at end of belt puts each part in individual carrier hung from link chain conveyor.—Factory, Aug, p71

Packaging with Vermiculite

Vermiculite-cushioned fragile objects, shipped thousands of miles, reach their destination in excellent condition. General Mills has packaged pie, cake and other baked goods in vermiculite.

The firm reports these properties make vermiculite an ideal cushioning material:

1. Shock absorbing and resilient
2. Minimizes leakage danger
3. Acid and alkali resistant
4. Fireproof
5. Non-toxic
6. Rodent- and vermin-proof
7. Lightweight
8. Low cost

General Mills has tested vermiculite-packed shipments of baked goods for 2 yr. Sent air express, the products remained fresh and undamaged throughout their shipment.—Mod Packaging, June, p80

Ceramic Coatings Prevent Exhaust-Gas Corrosion

Research by U. S. National Bureau of Standards on corrosive effects of lead bromide vapors demonstrates that uncoated heat-resistant alloys corrode fairly fast but that certain ceramic coatings prevent such corrosion.

Lead bromide is present in exhaust gases of all engines burning leaded gasoline. It comes from the reaction between tetraethyl lead and ethylene dibromide, which are added to improve combustion and scavenging.

Five alloys were tested—Inconel, types 347 and 19–9 DL stainless steels, Vitallium, and S-816. Latter two alloys are for turbine blades. Ceramic coatings tested were NBS types A-417, A-19, and A-520. Specimens were exposed to lead bromide for 6 hr. at high temperatures.

All five uncoated alloys corroded, but Vitallium, S-816, and Inconel were notably more resistant than 347 or 19–9 DL. Ceramic-coated test specimens stood up satisfactorily.—Prod Eng, July, p165

Reduction Dulls Car Finish

Why does a painted metal finish lose its luster with age? Engineers at General Motors Research Laboratories think they have the answer.

According to them, moisture is the villain. And chemical reduction, not oxidation, is to blame for the eventual dulling and chalking.

Light acting on zinc oxide in the presence of moisture causes hydrogen peroxide to form. But the research showed that strangely enough the peroxide then acts as a reducing agent. This theory may be the foundation for new advances in prevention of paint, lacquer and enamel failure.—Chem Wk, June 30, p19

Modern Distribution System Paces Electrical Advances

Wiring-system design developments are directed toward advancing utilization needs and considerations of adaquacy, accessibility, and control.

The most spectacular developments in interior distribution that have occurred in recent years are the enclosed busway and the load center substation. Present trend is toward their increasing acceptance and use.

Growing load requirements have greatly increased size and capacity of service entrance equipment. This trend is sharply upward. Present practice will probably be altered in the years ahead.

For heavier loads, use of grouped enclosed switches or circuit breakers is common practice. These often operate as the distribution panel as well as service switches feeding directly to branch-circuit panel boards. Look for more unit construction in service entrance equipment.

For wiring systems, rigid conduit remains popular, electric metallic tubing is gaining rapidly for feeder circuits requiring 2-in. or smaller conduit, and interlocked armored cable is getting extensive use in larger sizes for feeders. —Elec C&M, July, p54

New Snow-Fighting Unit

Designed and built by Wm. Bros Boiler & Mfg. Co. for the Canadian Pacific RR, a combined rotary snow plow and melter represents a new approach to snow fighting. Rotary rakes, rotors, and chutes on the front end of a flat car pick up and discharge snow and ice in any direction or into a snow-melting tank also mounted on the flat car.

Snow, cast into the melting tank, is melted by hot-water sprays. Hot water is furnished by the following locomotive. Capacity of the tank is 19,000 gal. When this much melted snow is accumulated, the unit is moved to a bridge or other suitable location and the water discharged through outlets in the lower sides of the tank.—Rail Eng & Main, July, p634

Low-Cost Drawings, Models

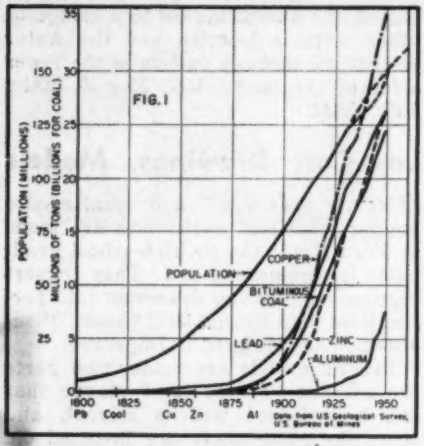
"Picture drawings" and quarter-size plaster models of assemblies are made at Ford Motor Co. by high-school graduates in commercial art. They convert regular engineering drawings into perspectives on a special grid paper. Visualization of projects is improved.

Plaster models are made, new parts are covered by a sheet of plastic that can be softened with a solvent, and sheet-like components are fastened on. Cost for drawings and models are low. —Am Mach, Aug 6, p145

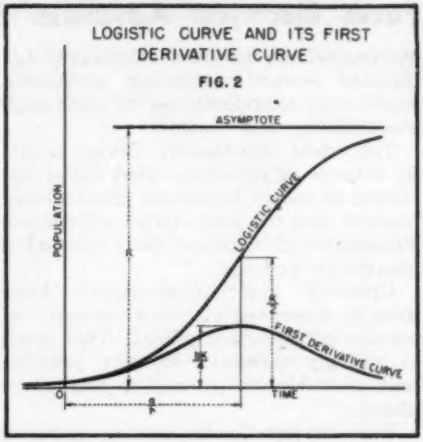
TAKES BREAD TEMPERATURE

Trend to instrumentation in bakeries has led to taking baked-bread's temperature. If bread is packaged too hot, mold may form. So Federal Baking Co. employs a sharp, needle-like thermocouple leading to temperature recorder. Probe is located over loaf conveyor that feeds wrapping machine. —Food Eng, Aug, p73

These Curves That Chart Nearly Every Kind of Activity . . .



***U. S. POPULATION** growth yields logistic curve Mineral production gives similar curves.*



***LOGISTIC CURVE** (upper) is cumulative production. Lower curve shows annual production.*

Predicts Mineral Futures

• Logistic curve forms basis of new approach to predicting mineral industry futures. Growth and decay of industry follow pattern

KNOWLEDGE OF FUTURE DEMANDS on the mineral industry would be useful information. A study by S. G. Lasky, U. S. Department of the Interior, points out a valuable aid in planning for the future. The study's thesis is that a mineral industry grows and decays according to a systematic pattern determined by certain factors.

This pattern is reflected in a curve known as the logistic curve or equation. Original purpose of the curve was to describe growth of human populations. It has since been extended to cover any problem in which an activity starts slowly, speeds up, and then slows down. The mineral industry is no exception to this pattern.

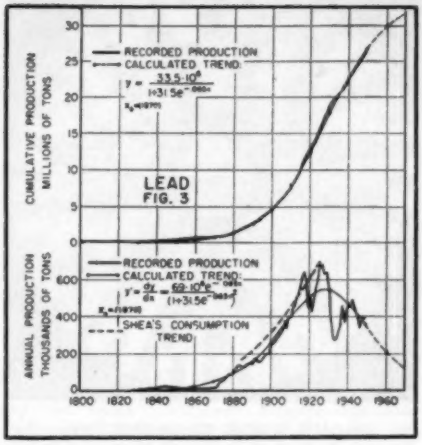
Certain factors influencing growth, however, are peculiar to the mineral industry:

- Political climate—that is, the relation between government and industry.
- Demand.
- Number, size, quality of the deposits in the ground.
- Ability to find these deposits.
- Technologic progress.

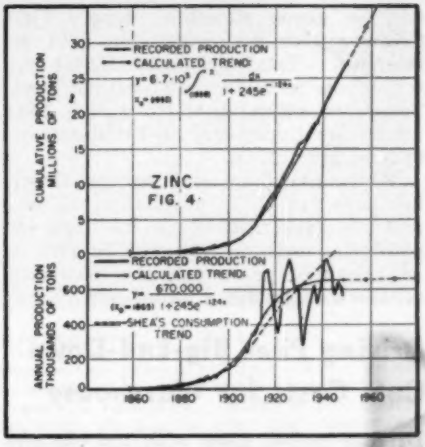
Growth factors are a growing population and a growing per-capita demand. Decay factors are the finite number of deposits in the ground, the increasing difficulty of finding them, and competition from substitutes.

Fig. 1 shows the curves of cumulative mineral production as plotted from recorded data. The U. S. population curve, a logistic curve, is also shown.

. . . Can Also Plot the Probable Course of Mining



***DECLINING LEAD OUTPUT** (U. S.) follows both logistic curves. Trend is to decline.*



***FLATTENING ZINC OUTPUT** (U. S.) also follows curves, reaching plateau at 675,000 tons.*

Fig. 2 is a diagram of the simple logistic curve. In terms of mineral production, the logistic curve is the curve of cumulative production; the bell-shaped curve is the curve of annual production. Both curves have a direct mathematical relationship.

The curves for lead (Fig. 3) and zinc (Fig. 4) illustrate the value of the method. The statistical record of lead production began in 1801. Thus we have a record of nearly 150 years to be examined for trends of growth and decay.

Lead production in the U. S. appears now to be in a third cycle. The first ended in 1826. Prior to that time, production approximated 1,000–2,000 tons a year. The second cycle extended from 1827 to 1870. Peak production came in 1845 at 30,000 tons.

The third, or present, cycle got its start with the opening of Western deposits to exploitation. Annual production rose steadily and rapidly, until it reached 651,000 tons in World War I. The peak of the current cycle was reached in 1928. From then on, production declined. Not even the demands of World War II could raise production from its low in the 30's to a point much higher than indicated by the declining course.

The calculated trends imply that, short of some extraordinary development that will start the industry on a new cycle of growth, mine production will be down in two or three decades to about 100,000 tons yearly. At that rate, lead may be produced mainly as a by-product of zinc mining.

The maximum capability of the American zinc-mining industry, on long-term balance, is about 675,000 tons annually. (See Fig. 4). The average ratio of zinc to lead for the major lead-zinc producing districts is about 6 to 1, so that by-product lead production from them would be 100,000 tons a year.

The calculated trends imply also that,

unless a new cycle develops, the total lead to be produced from U. S. mines will be about 35-million tons. This figure agrees with available data on reserves. Total production, plus reserves up to 1944, is 31-million tons. Thus the estimate of 35-million tons allows for a discovery of 4-million tons of lead after 1944.

While the data and curves shown here are for U. S. production of lead and zinc, the method can be used for predicting mineral industry futures in any country possessing the necessary data.—Eng & Min J, Aug, p60

Driving Piles Big-End-Down Cuts Costs for Warehouse

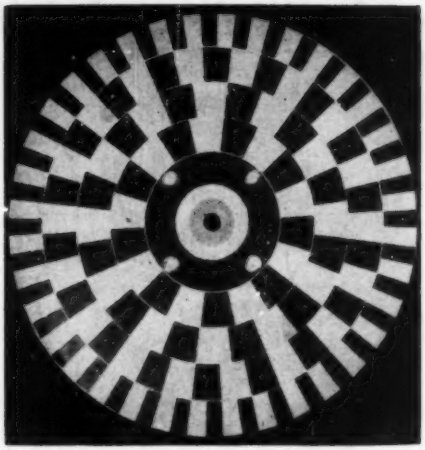
Driving timber piles with the big end down saved Safeway Stores, Inc., $500,000 on warehouse construction in Kearny, N. J. Soils at the site include a top stratum of dumped fill that overlies compressible meadow mat and organic peat. Beneath this is a sand stratum. Below the sand is compressible clay and silt.

The upper stratum of sand was not thick or dense enough to prevent an 8-in. tip timber pile from punching through. Timber piles to the lower stratum would cost more per ton of permissible load than composite piles.

The economical solution was to drive timber piles with the large end down. Three or four times as many wood piles were required, but their low cost made a substantial saving.

Generally, the piles stood the driving well. When piles split at the top frequently in an area, holes were spudded through the dumped fill by driving a bullet-nosed pipe, then withdrawing it to insert the timber pile.

Movement of the piles was expected but did not occur. Piles became firm laterally immediately after driving.—Eng News-Rec, June 21, p30



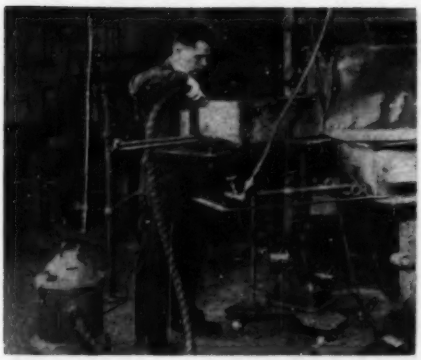
HOME-MADE TACHOMETER

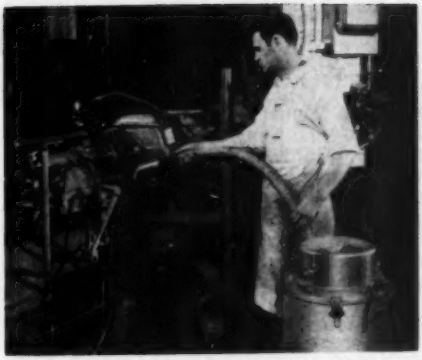
First, make a flasher from a 60-c. neon tube by enclosing it in a housing with semicircular reflector. Then make the disk (above) and mount it on end of rotating shaft whose speed you want to measure. At certain speeds, parts of pattern appear to stand still. Outer ring with 36 white sections appears stationary at 100, 200, 300, etc. rpm. Second ring stands still at 200, 400, 800, etc. rpm.; third ring at 300, 600, 900, etc.; fourth ring at multiples of 400 rpm. Shaft speed can be judged fairly closely.—Power, July, p128

One-Car Train Makes Profit

Normally, a railroad needs a lot of passengers to make money on its passenger service. Not always, though. Western Pacific RR is turning a good profit on a 924-mi. run that is mostly through wide open spaces.

A one-car train designed by the Budd Co. for economical short-haul local service makes the profit possible. Powered by a diesel engine slung under the frame, the one-car train carries 71 passengers in two air-conditioned compartments. The baggage compartment has a 5-ton capacity.—Business Wk, July 7, p64





NEW USES FOR PORTABLE VACUUM CLEANERS

Portable industrial vacuum cleaners are not limited to sweeping floors. Pictures show you two ways a vacuum cleaner can aid production. Powdered metal (left) used as a sealer in heat treating is sucked out of steel pans by a portable cleaner. Permanent-type magnet screen in cleaner picks up any contaminating metal. Almost 100% powder is reclaimed. Metal chips (right) are taken off a lathe after each operation. Magnets in cleaner separate metal from the dirt.—Factory, Aug, p108

Direct Extrusion Applied to Light-Metal Scrap

While slabs and billets made only from aluminum and magnesium fines cannot be rolled or extruded, direct extrusion of such light-metal scrap is possible. The method is simple enough that reclamation can be done at or near the point of origin of the scrap.

In a successful experimental project, conducted by Max Stern, a consulting engineer in New York, extrusions were made of aluminum turnings, foils, and grindings. The scrap was first cleaned, then heated and fed into an experimental extrusion chamber.

This chamber was a 3-in. ID cylinder with 1-in. thick tool-steel walls. Extrusion die and ram also were made of tool steel. A resistance heating unit surrounding the chamber raised scrap temperature to 750° F. Extrusion pressure was 15 tons per sq. in.

Heat and pressure develop a consistency in scrap similar to that of cold lead. In the first compressing stage, a dense aluminum body is formed. As pressure goes up to the point required for extrusion, solid rod or profiles are obtained.—Iron Age, June 28, p71

Conveyor Loads 26 Cars

Twenty-six railroad cars can be loaded at a truck ramp at Pomeroy, Ohio, without moving the cars once they have been set in by the switching crew. Coal is distributed to two strings of 13 cars each on adjacent loading tracks.

Pipe columns between the railroad tracks support an elevated narrow-gage track 550 ft. long, on which rides a 36-in. by 254-ft. belt conveyor mounted on flanged wheels. The belt is reversible and is equipped with a pair of discharge chutes at each end. The entire conveyor can be trammed in either direction. Control platforms at each end of the conveyor house the operators. —Coal Age, July, p104

TECHNICAL SHORTS

Oversize Dipper—One open-pit operator uses a 6-yd. dipper on a 5-yd. shovel. His reason: Ammeter on shovel showed that more power was used in effort to fill 5-yd. dipper full than was required in filling 6-yd. dipper substituted nearly full. To fill last quarter-yard of 5-yd. dipper took much crowding.—Eng & Min J, Aug, p73

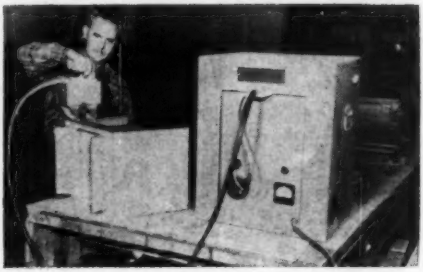
Supersonic Wind Tunnel—Wind-tunnel drive ordered by National Advisory Committee of Aeronautics from General Electric Co. will put out 180,000 hp. It will power 8-ft. tunnel to create wind velocities several times the speed of sound. Drive will consist of four a-c. induction motors of 45,000 hp. each.—Prod Eng, July, p168

Super Microscope—A 1-million-power microscope that uses only electronics instead of electronics plus lenses and magnets has been built at the University of Chicago. Designed for studying metals, it is cheaper to build than commercial units and has a greater magnification.—Business Wk, July 14, p92

Piston Ring—Largest centrifugally cast iron piston ring is 29 in. in dia. Double Seal Ring Co., who made it for Mexico's Tacubaya diesel plant, claims ring is twice as strong as one made by static casting.—Power, Aug, p115

Heavy Concrete Shields Cyclotron—Extra-heavy concrete for shielding is a byproduct of nuclear research. Concrete made with metal aggregates gives a unit weight of 300 lb. per cu. ft. Some research has produced concrete weighing as much as 370 lb. per cu. ft.—Eng News-Rec, July 26, p65

How To Raise Tool Life—Increase of several hundred percent in tool life and better finishes are possible at higher machining speeds. Secret revealed by research just completed is to apply coolant in pencil-sized jet at 2,000 psi. from below to strike line between work and toolbit.—Am Mach, July 23, p105



DIELECTRIC-HEAT JOINING

Wood, plastic and cardboard forms are joined at Adcolor Display Co. by high-frequency dielectric heat for hardening spot or ribbon gluing. Trigger-controlled hand gun has 12-ft. coaxial cable. Method saves time and space, assures uniform quality, permits assembly without nails or screws.—Elec World, July 30, p113

1952 Model Cars—More changes and improvements than for any model year since the early postwar period are expected. New-type automatic transmissions, power steering, and other major changes seem assured for late fall or early winter release.—Am Business, July, p7

Synthetic Can Linings—Food canned in tin cans is getting added protection through use of organic-protective linings. Among linings that supplement tin coating are oleoresinous, phenol-formaldehyde, vinyl, and wax. Kind of lining depends on the food.—Food Eng, Aug, p114

Binds Sand Cores—Another material for making binders for sand cores has been patented. Material is made by reacting glycerine with reaction product of a tall oil vinyl ester and maleic anhydride. When used with foundry sand, core is heat-treated to cure the glycerine containing resinous binder.—Mod Plastics, Aug, p192

Larger Turboprop Engines?—Hint of higher horsepowers (over 10,000 hp.) expected from turboprop engines lies in activity in developing methods of attaching propeller to engine to replace conventional shaft and spline arrangement now used. Bending moment on shaft and the desirability of tucking controls inside are spurring research into several possible solutions.—Aviation Wk, Aug 13, p11

Drilling with Oil—Oil-well drilling time has been cut in half in some cases by using emulsified oil in drilling fluids. Other advantages are longer bit life and lower rotary torque, pipe drag and circulating pressure.—Oil & Gas J, June 28, p45

Precise Comparator—A pneumatic comparator developed at the British National Physics laboratory has a magnification of 60,000 to 1. Each dial-indicator division represents 0.000001 in. Changing size of control orifice reduces sensitivity and provides for direct measurements of up to a few thousandths of an inch.—Mach, July 14, p1029

Pumice Prevents Caking—U. S. patent has just been issued on use of finely ground pumice to prevent caking during storage of borax, boric acid, and sodium nitrate. Needed is about 0.25-1.5% by weight of pumice ground to pass 325-mesh screen.—Ceramic Ind, July, p57

Battery Starts at −65°F.—University of Michigan Engineering Research Institute has developed a lightweight storage battery that operates effectively at temperatures ranging from 165°F. to −65°F. U. S. Army Ordnance Corps will get the battery for its vehicles.—Auto Ind, Aug 15, p23

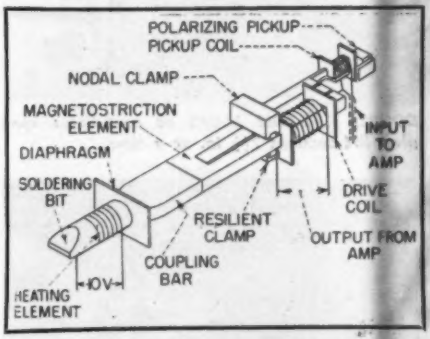
Heat-resistant Cottons—Treatment developed by U. S. Southern Regional Research Lab. makes cotton four or five times resistant to heat and rot than the untreated fiber. Partially acetylated cellulose process allows cotton ironing-board and pressing-machine covers to compete with synthetic-fabric covers.—Textile World, Aug, p224

Burial Test—Recent uncovering of a 40-ft. bare aluminum bypass installed 17 months ago in an 8-in. welded aluminum pipe line revealed no corrosion, no discoloration. The bypass was installed with special valves so it could be dug up at intervals for inspection without disturbing main line.—Weld Eng, Aug, p58

Ultrasonic Cleaner—Now in experimental use at Shick, Inc., the device transmits sound waves through solvent, removing grease, oil, metal shavings, and lapping compound from the tiny openings in electric shaver heads. General Electric Co. made the unit.—Factory, Aug, p82

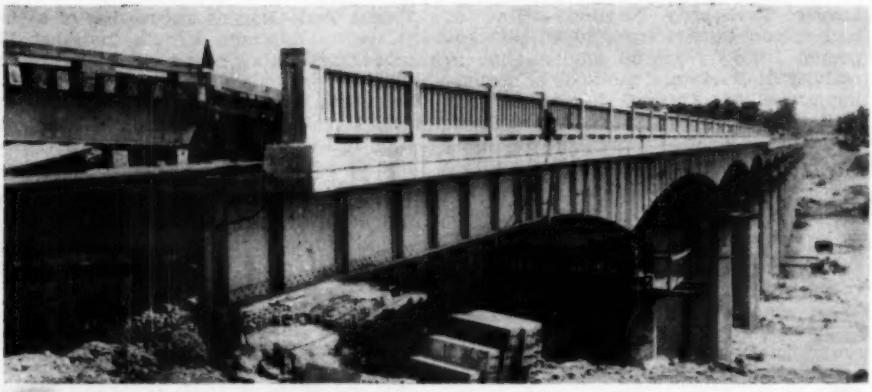
More Cortisone—Practical synthesis of this scarce drug from a plentiful raw material is good news to the medical professional. Syntex, S. A., of Mexico City developed the process. Raw material is a yam.—Chem Wk, July 21, p25

Air-drops Bulldozer—A 9½-ton bulldozer, heaviest piece of machinery dropped to date by the U. S. Air Force, landed without damage. Small extraction parachute pulled 'dozer clear of airplane. Then six larger chutes opened to lower 'dozer to ground.—Const Meth & Equip, Aug, p36

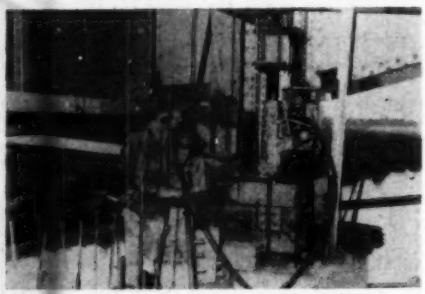


SOLDERS BY ULTRASONICS

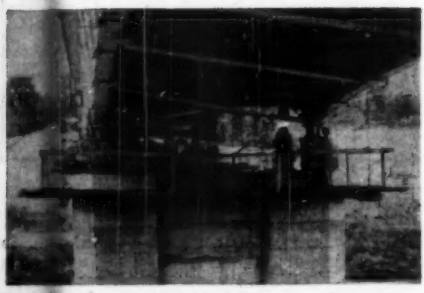
Soldering iron, developed in Britain for tinning of aluminum, subjects aluminum to ultrasonic vibrations as molten solder is applied. A magnetostriction element generates vibrations. Output from pickup coil is amplified and fed back to driver coil to move the vibrator.—Electronics, Aug, p134



THIS 1,500-FT. BRIDGE was lifted in 30-in. lifts. Each of four continuous girder sections was raised one at a time, never more than one lift apart so traffic could be maintained.



DOUBLE 100-TON JACKS at continuous span piers lift sections 7½ in. at a time.



BLOCKING under span shoe is set for encasement of concrete after 30-in. lift.

Bridge Raised by Air Jacks

INGENUITY set the pace on a bridge raising job across the Savannah River in Georgia. Four sections of continuous deck girder spans, totaling 1,500 ft. long and weighing 4,000 tons, were raised 17 ft. by a clever arrangement of air jacks. Traffic was maintained all the time except during actual lifting operations.

E. W. La Plante Co. did the raising, and the Joyce-Cridland Co. supplied the air jacks. Each continuous section, 375 ft. long, was lifted separately as a unit in 7½-in. increments for 30-in. lifts. Thus, there was never more than 30 in. difference in elevation between adjacent sections so traffic could be maintained over timber ramps. An approach system of hinged ramps supported by adjustable trestles took care of traffic.

I-beam jacking pads were welded to the under side of the end transverse

beams of each span. Jacks were set on the same piers as shoes. Jacking blocks, 7½-in. square and in various lengths, were precast from 5,000-lb. concrete. These blocks served two purposes: they were built up under the shoes as the spans were lifted, and they were also built up under the jacks for each increment of lift.

Each jacking set-up for lifting a section required 16 air jacks. Lifts were made ½ in. at a time, all jacks acting in unison. Jacks were operated by one man at each pier working two air valves.

All jacking operations were synchronized by a control man on deck who was in constant touch with each jack operator through two-way headset telephones. Jack operators checked the progress of each move by gage boards set up at the jacking stations.

Each 7½-in. run was just high enough to permit slipping another row of concrete blocks under the span shoes. Then the jacks were retracted, throwing the weight onto the shoes. Since the tops of the jacks were clamped to the jacking pad, the bottoms of the jacks moved upward when retracted. This allowed space for setting new blocks under the jacks, and the lifting process was then repeated until a 30-in. total lift had been made.

As a precaution, during the lifts, the span shoes were followed up with a series of ¼-in. steel shims to hold the load in case of jack failure. However, this type of jack will hold its load even if the airlines are broken or if the air motor fails.

When one section had been raised 30 in., the jacks were removed to another section. Then the temporary block piers were encased in a 30-in. lift of reinforced concrete. It usually took from 25 to 30 min. for a jack run. Traffic was held up during these times. —Const Meth & Equip, Aug, p44

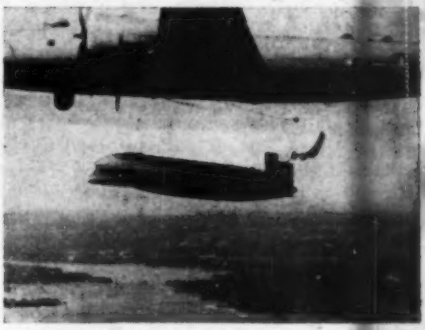
Transmission-Line Power Operates Aircraft Warning

Providing aircraft warning lights in mid span of transmission-line river crossings can now be done with a new neon light that is operated by energy taken from the line itself. And the light can be installed without a bosun's chair rig.

The idea is a joint development of Washington State College and the Booneville Power Administration. First installation was made at a Columbia River crossing on a BPA line.

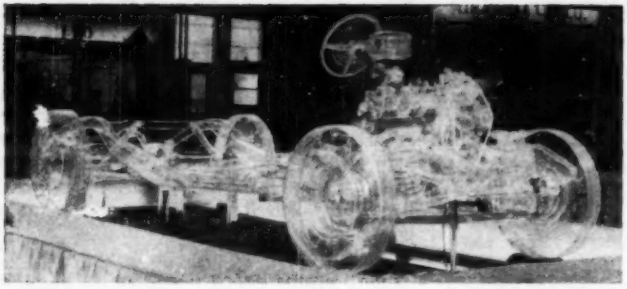
A special installation trolley pushes the neon light assembly out to the desired spot, locks it in place, uncouples itself from the light assembly, and returns to the tower. Therefore, a lineman need not ride out the cable.

The assembly has two neon tubes. When one burns out, the other automatically lights. Current to operate tubes is supplied by magnetic induction from the transmission line itself.—Elec West, July, p63



RADIO-CONTROLLED LIFEBOAT

Lifeboats were dropped from B-29s during the last war, but now something new has been added. When the lifeboat hits the water, it is radio-controlled from the airplane, directed to survivors in the water, and then set on the right course.—Electronics, Aug, p136



SEE-THROUGH CHASSIS

Transparent acrylic full-scale model of the engine, chassis, and wheels made by Plymouth Motor Corp. provides an effective display of the mechanisms of a Plymouth automobile. Some 1,200 Plexiglass parts were used. — Mod Plastics, Aug, p90

New Shoemaking Process

A new shoemaking process, involving an insole with an attached rib, has been announced by American Maid Footwear, Inc. Called the Danton Process, it involves a flexible insole with an attached preformed rib. Stylewise, it creates a platform or mudguard effect, yet with the foot resting on a light, flexible insole.

The process is adaptable to the manufacture of slip-lasted and conventionally lasted cement sole shoes in casual types for men, women, and children.

In construction, the last is inserted into the fitted upper and then cemented to the insole with attached rib. The platform wrapper is pulled over the rib and cement-lasted to the under part of the insole. Not only does the process assure a tight seal, with no gap between the rib and the upper of the shoe, but no marginal stitching is visible. A platform effect is thus created.—Boot & Shoe Rec, Aug 1, p100

Testing Sand Strengths

Which type of strength test should be used to find the bond strength of molding sand is a frequent question. Tests conducted at Harry W. Dietert Co. indicate that:

1. Green compressive strength test together with green deformation gives most detailed information as to workable strength of sand. The two tests permit controlling bond strength and plasticity separately.

2. Green impact strength test values could be used for control but should not be used for research testing or detailed controlled testing. Test is influenced by green deformation but not enough to be regarded as a sand toughness number.

3. A sand may have a low impact strength even though compressive, shear and tensile strengths are good.—Foundry, Aug, p150

World Business Briefs

▶ **In Peru** the government's Corporacion Peruana del Amazonos and the Cellulose Development Corp. think they can make pulp out of a wild jungle tree and rice straw. They have asked the Ministry of Finance for $350,000 for a pilot plant.—Business Wk, Aug 4, p123

▶ **India and Pakistan** will benefit from a Ford Foundation $5-million project. Agriculture will get most of the money. —Business Wk, Aug 11, p151

▶ **Italian machine tools**—$1.5-million worth—will help out the U. S. aircraft industry's production drive. A joint mission representing the U. S. Air Force, Wright Aeronautical Corp., and Curtiss-Wright has placed orders in Rome.—Business Wk, Aug 18, p146

New Loom Attachment Weaves Waterproof Fabrics

An inexpensive loom attachment for weaving extra-tight, naturally waterproof cotton fabrics has been developed by the U. S. Southern Regional Research Laboratory. Basic principal of the attachment is the extra "cover" produced on a fabric by having less tension on one shed layer than on the other as the lay beats up. This allows the loom to insert more picks per inch than could be achieved otherwise.

By means of a push bar actuated from an auxiliary shaft driven from the loom camshaft, the attachment applies tension first to one shed and then to the other during successive beatups of the filling. When released, this tension introduces considerable slackness in the shed layer and allows the filling thread to be beat up either over or under the previous pick. On the next pick, the slack shed becomes the tight shed and pulls the previous over- or under-riding pick into the plane of the fabric.

Constructed mostly of standard loom parts, the device can be built at a very reasonable price. It is easily installed on standard looms.—Textile World, Aug, p143

Rough-Road Testing Unit

New 30-ft. long "rough-road" testing machine designed by Ford Motor Co. permits inspectors to stand under, sit in, or walk around a car and observe reactions as it "travels" over a jarring road at speeds of 7 to 42 mph.

Built over an inspection pit, the machine operates with four sets of motor-driven double-rollers, one for each wheel of the car. One roller for each car wheel is a smooth drive-roller, accelerating the wheels of the car to any desired speed. The matching roller has a 2-in. hump that, at high speeds, accurately simulates the twists and torsions of a car as it travels over roads. —Auto Ind, Aug 15, p22

New Jobs for Tapes

Reinforced flexible tapes are not only substituting for steel tape but are being applied where other fastenings are not practical. They can be successfully used to:

- Prevent bulging of cartons carrying heavy goods. Carton walls are prebanded with the tape.
- Bundle together small cartons to form a unit package.
- Secure, scratch free, heavy rolls of sheet metal.
- Palletize bulk materials.

The tapes are reinforced with rayon or glass fibers, and acetate or vinyl film or kraft paper forms the base. Breaking strength is as high as 800 lb. —Mod Packaging, July, p98

WELDS BEAMS FROM PLATES

Virginia Bridge Co. fabricates big beams by automatic welding, with the submerged-arc process doing the main job. Beam components are first assembled by manual tack welding. With assembled beam held in trunnion jig, automatic submerged-arc-welding head travels on carriage down track applying finished fillet welds. Ball-bearing trunnions permit beam to be rotated to other welder on other side.—Const Meth & Equip, Aug, p82

caustic soda

investigate these outstanding Dow Chemicals

solvents

Dow is the source for a wide range of solvents. Due to their ability to quickly dissolve greases, fats and waxes, Dow chlorinated solvents are in wide demand in the metal working industries. In addition to chlorinated types, many other Dow chemicals have noteworthy solvent power. Among them are Dowanol glycol ethers, glycols, polyglycols and alkanolamines.

fumigants

Dow soil and grain fumigants are helping to grow and protect much-needed foodstuffs for the world's population. Dow soil fumigants control weed seeds, nematodes, wireworms and other root attacking parasites so that greater crop yields result. Grain fumigants protect grain, flour and other food in storage or in transit from the destructive attacks of insects and rodents.

plastics

Styron (Dow polystyrene) is a thermoplastic material increasingly used by manufacturers to bring added sales appeal and low production costs to such items as lighting fixtures, radio cabinets, and electric refrigerator parts. Other Dow plastics include: Ethocel (Dow ethylcellulose) a tough plastic that combines lightness with good shock resistance; Saran for extruding and weaving into seat covers, screens; Saran film used for packaging.

agricultural chemicals

A recognized leader in agricultural chemicals, Dow manufactures both basic ingredients and formulations that help farmers raise more and better crops and livestock. The Dow line includes: weed and grass killers, insecticides, fungicides, soil and grain fumigants, plant growth regulators, veterinary chemicals and wood preservatives. Dow's technical staff develops new farm chemicals and thoroughly tests every product before offering it to the user.

There's a Dow Sales Representative near you. Contact him for information about these products and more than 600 other chemicals which Dow supplies to industry or write to Dept. EX-7.

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THE DOW CHEMICAL COMPANY • *Midland, Michigan, U. S. A.*

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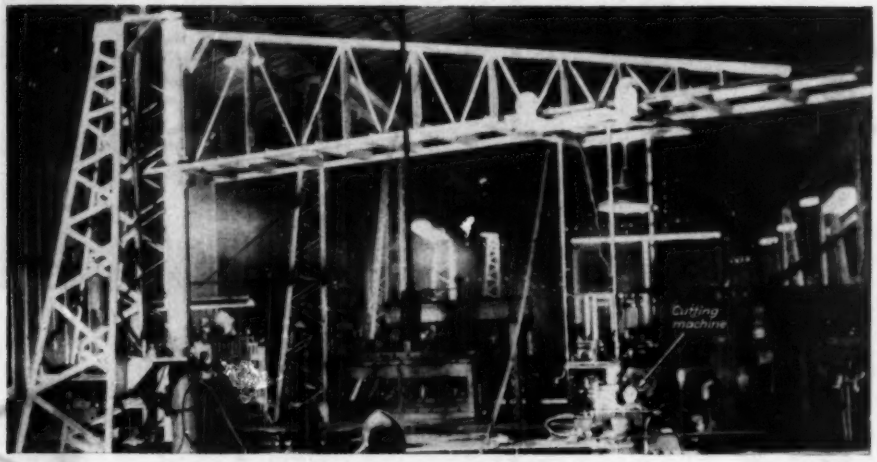


SPROCKET CUTTER NEEDS NO MASTER PATTERN

Sprocket wheels from 3 in. to 5 ft. in dia. and with as many as 361 teeth can be flame-cut from sheet steel up to 6 in. thick with the Schrock cutter. A 25-tooth sprocket of 1-ft. dia. and ¾ in. thick is cut in 6 min. No master pattern is needed to guide oxy-acetylene torch. Unit is suspended over sheet from overhead crane and positioned by centering point resting in sprocket center hole punched in sheet surface. Five gear-shift systems and ten cams control rotational speed of unit and radial movement of torch, thereby determining shape, size, and number of teeth. Manufacturer is Idaho Sprocket & Machine Works—Prod Eng, July, p116

Studies Altitude Flow

A new super aerodynamic windtunnel intended to explore the properties of flow at simulated altitudes of 80 to 200 miles has gone into operation at the University of California.

The new test device uses a molecular beam similar to the type used in nuclear research. The stream of molecules is fired into an evacuated chamber from a small furnace that has an opening at one end. Muzzle velocity is determined by the temperature of the furnace; at 1800° F., the speed is 1,800 mph.

A system of slits controls and focuses the molecular beam to strike against model surfaces in the chamber. Evacuation to the low-density level comparable to rarefied atmosphere takes a week of continuous operation of a three-stage pumping system.

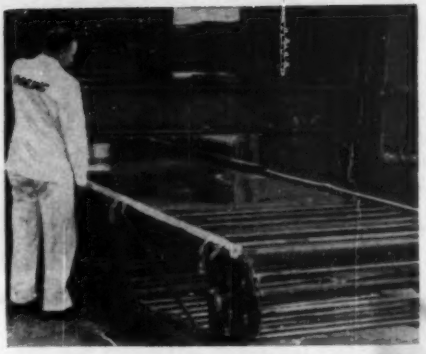
Sensitive gages detect pressure differences of one ten-billionth of a sea-level standard atmosphere.—Aviation Wk, July 16, p51

Quenching Oil Purified

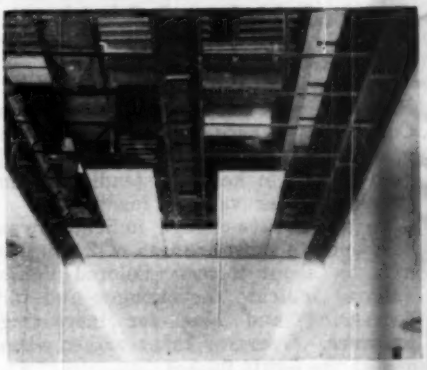
Three times longer life for quenching oil—that is the result of installing Honan-Crane oil purifiers in quenching system for marquenching at International Harvester Co.'s Fort Wayne plant. Purifiers remove dirt and oxidation products. They also enable oil to drain more quickly from parts, which reduces oil consumption and cost of cleaning parts after quenching.—Foundry, July, p160

This Month's How To . . .

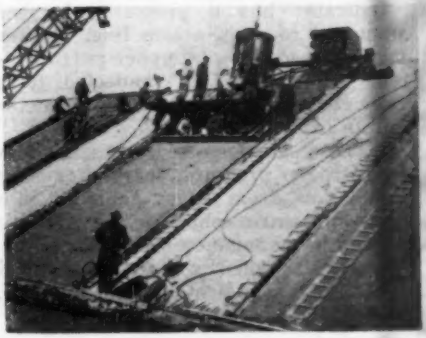
. . . **to get ultra-smooth surfaces** on aluminum-alloy sheets so as to insure good aerodynamic characteristics for high-speed-airplane parts is shown at Boeing Aircraft Co.'s Wichita plant. A protective coating is applied to the metal as soon as it is received and after each manufacturing operation. Coating called Orange Dyed No. 968 by its manufacturer, Minnesota Mining & Mfg. Co., is sprayed on each sheet to a thickness of 0.004 in. When quick-dried under infrared lights, the lacquer coating peels off like tape.—Am Mach, Aug 6, p147



. . . **simplify lighting installation** was the reason for Austin Co.'s development of its patented Integrated Ceiling Lighting System. Special trough-like structural member, called a troffer beam, houses the fluorescent fixtures and acts as integral part of building structure by spanning distances between roof trusses. Troffer beams also support suspended ceiling, catwalks. and other wiring system. System is highly flexible. Beam shown in center is covered with ceiling blocks, but can be used later for additional lighting.—Elec C&M, Aug, p44



. . . **concrete a 1 on 1½ slope** without a face form is done with a contractor devised rig. Tuller Const. Co. built a traveler, combining a one-sided hopper (also acts as a strike-off) and a reciprocating-plate screed. Sixteen feet wide, it has four wheels that ride on side forms. An electric motor oscillates two screeds in tandem. An air hoist powers the rig up and down the side forms. Concrete is poured into the hopper as the machine is drawn up the slope. Air vibrators compact concrete. —Eng News-Rec, Aug 9, p28



***PILOT GAGE BOARD** at power plant includes lights of pressure-change indicator.*

Colored Lights Guide Manual Boiler Operation

Boiler operators at three Detroit Edison Co. plants where stoker-fired steam generators are manually controlled needed help in keeping steadier steam pressure under varying loads.

So a pressure-change indicator was developed to show changes of 2 psi. per min. in about 2 sec. Colored lights (above) indicate the changes, red for decreasing and blue for increasing pressure. Operator takes action when one of the lights flashes.

Indicator has a pressure chamber connected to main steam line. Lower part holds condensate, upper part nitrogen. Upper part is connected to a brass chamber by a mercury manometer and an orifice.

When steam pressure drops, so does the nitrogen pressure, thereby causing a gas flow from brass chamber into main pressure chamber. Mercury heights in manometer legs change.

Electrodes then complete electrical circuit to light indicator lights.—Power, Aug, p92

Paraffin Wax Is Molded in Continuous Equipment

The switch from batch to continuous molding of paraffin wax has been made successfully at Magnolia Petroleum Co.'s Beaumont refinery. Advantages: uniform wax cakes, one-fifth the labor requirements, much less wax spillage, one-tenth the floor space.

Molten wax is pumped through heat exchangers that adjust wax temperature to 140–160° F., depending on wax melting point. Wax is then directed to a hopper, which near the bottom has six pistons that discharge wax in exact quantities to molding pans.

Pans, 19 in. long by 11⅛ in. wide by 2 in. deep, can take from 8–12 lb. of wax. Trays carry the molding pans through cooling compartments to form solid wax cakes.

Cooling is done by circulating cold air, which is obtained by passing it over coil evaporators connected to an ammonia compressor. Trays make 14 passes through the cooling section. Wax cakes are discharged automatically. J. W. Greer Co. cooperated in building the equipment.—Oil & Gas J, July 26, p238

Locates Cracks in CI Cases

Cast-iron cases for automatic transmissions are checked for cracks in a simple way at Borg-Warner Corp.'s Warner Gear Division. All cases, after machining, are dipped in oil to prevent rusting in storage.

Before they are sent to assembly, they are passed through a degreaser to remove surface oil. Any crack, no matter how small, will show oil just after degreasing because of expansion from heating. So an inspector is stationed at the discharge end of the degreaser to check all castings for oil.—Am Mach, July 9, p185

Expanding Rubber Die Forms Complex Contours

Vic Patushin Industries, Inc., form the complex contours of jettisonable aircraft fuel tanks with a rubber bag acting as the male die. The rubber stretches cones or cylinders into elliptical, complex shapes.

A wood pattern built to the size of the finished part and covered with plastic releasing material is suspended inside a Meehanite casting cavity. A sheet of 0.068-gage 3SO aluminum sheet, cut to a flat pattern, is rolled into a cone or cylinder and seam-welded.

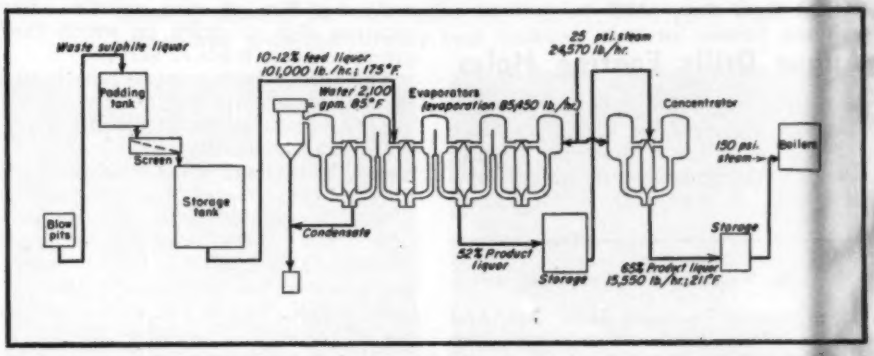
The seam-welded sheet-aluminum cone is placed inside the casting cavity. The rubber forming die, or bag, is lowered until it fits snugly inside the cone. Fluid is pumped into the bag until 400-psi. pressure has been attained. Expanding rubber will stretch-form the straight sided cone into a curved cone configuration. At this point, the pressure is released and the bag lifted out.

The process results in a saving of 75% in fabrication costs over spinning. Sections require only one longitudinal seam weld. Other methods using stamped halves require two seam welds. —Aviation Wk, July 23, p32

More Isotopes for Export

Seventy-three radioisotopes have been added to the list of those available for export, making a total of 99. The U. S. Atomic Energy Commission has now included all radioactive materials sold in the U. S. on an unrestricted basis.

Among the more useful of the newly available isotopes are cesium-137, yttrium-91, selenium-75, and tantalum-182 for industrial research; chromium-51, nickel-59 and 63, and tungsten-185 for metallurgical research; and rubidium-86, a valuable substitute for shorter-lived sodium-24 and potassium-42 in agricultural research.—Nucleonics, Aug, p80



FLAT-PLATE EVAPORATOR CONCENTRATES WASTE SULFITE LIQUOR

Pulp and paper makers can reduce stream pollution by evaporating and burning waste sulfite liquor. Gypsum scaling is a problem, causing fouling of surfaces, except in this flat-plate evaporator made by General American Transportation Corp. Switching liquor and steam sides of evaporator keeps all surfaces washed clean by dissolving action of steam and condensate. Vessels, pumps, valves, and piping also are switched and washed. Switch takes quick shutdown and adjustment of ten valves. Switching system is a development of Swedish engineer Curt Rosenblad, who licensed it to General American Transportation Corp.—Chem Eng, Aug, p181

Pillar-Soaking Reduces Dust to Within Safety Limits

Water infusion of coal at the Kenilworth mine of Independent Coal & Coke Co. has shown good results in reducing dust in face preparation and loading. Infusion of the pillars is started about 30 days before pillar operations begin.

A maximum of four infusion holes is drilled in the pillar. Hole diameter is 2¾ in. and the usual depth is 30-35 ft. Holes are terminated as near to the top of coal as possible.

Water is introduced through 1¼-in., 20-ft. long pipes at pressures of 30-40 lb. Brattice cloth strips secured with friction tape seals each hole. Water is kept running about a week.

As pockets are driven, the surface of the coal becomes damp to the feel and rock dust also changes color, showing that it is taking up moisture. Dust counts after infusion and mining operations are well within the safety limits. —Coal Age, Aug, p100

Augur Drills Footing Holes

In drilling some 500 holes for circular footings 5 ft. in dia. and 6 ft. deep for a Ford Motor Co. assembly plant, Long Construction Co. reports considerable cost savings with a big truck-mounted power auger. The machine put down from 6 to 7 holes per hr.

Mounted on a heavy truck, the rig is powered by a Waukesha engine. The unit revolves on a hydraulic-powered turntable for positioning the auger any place in a 180° swing around the truck bed. A hydraulic retracting system gives a 24-in. radial leeway in spotting the auger. Hydraulic rams also lift the boom into drilling position from its horizontal traveling position. The auger bit is raised by cables.

Hydraulic outriggers stabilize the truck during drilling operations. Holes up to 25 ft. deep can be drilled with a 5-ft. auger.—Const Meth & Equip, Aug, p49

Color Television Filters

The blue, green, and red filters used in the Columbia Broadcasting System color television employ either a color-dyed cellulose acetate sheet or a clear acetate sheet upon which has been deposited a film of color gelatin. The rotating disk or drum on which they are mounted is made of acrylic.

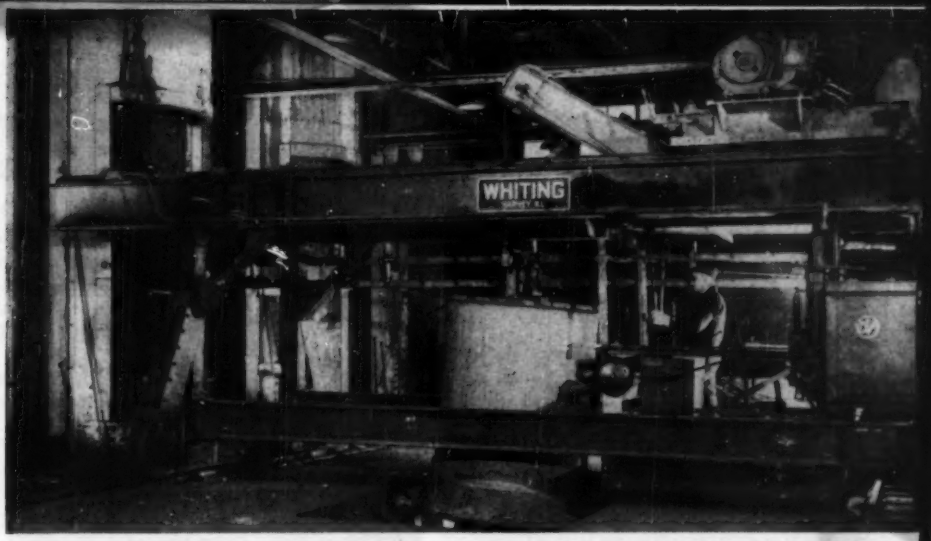
The disk or drum must be constructed of a material that will remain planar under the varying conditions of temperature and humidity encountered in normal use. Hard UV Lucite and hard Plexiglas have been found satisfactory.

The disk should be as thin as possible. Most CBS disks are made of 0.060-in. thick hard UV Lucite. Noise and vibration are minimized by balancing the disks to 1/5 gm. or less at the rim of the disk.

All color filter material is acetate. The filters are riveted to the acrylic supporting disk. Rivet holes in the filter materials have larger diameters than the rivet shank. This permits differential dimensional changes between the filter material and the acrylic without strain in either material.—Mod Plastics, Aug, p85

Do You Ask for Catalogs?

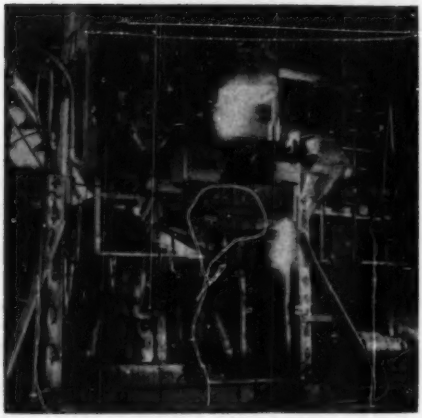
If you use our Production Ideas department and the catalog coupon, you undoubtedly have seen the note (as in this issue) "Good until Jan. 1, 1952." That gives you 3 months to get your coupon back to us. When we do get a late coupon, we try to get the catalogs sent to you. But manufacturers' stocks of catalogs run out; and catalogs get out of date (in case of very late requests) and manufacturers dislike to send out old catalogs. So why not send in that coupon as soon as you get your copy of the DIGEST?



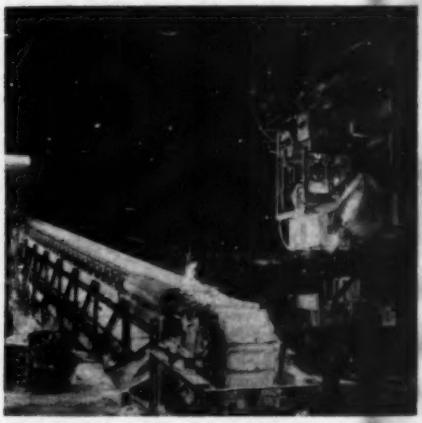
CHARGING BUCKET with cone bottom is filled and delivered by roller conveyors and transfer car to gantry-crane position. Crane lowers it into cupola. Lugs projecting from cupola wall stops lowering of bucket shell and opens cone bottom to spill charge.

How To Raise Metal Capacity

Growing demand for automotive castings at Studebaker Corp. led to modernized gray-iron foundry and doubling of metal poured per day



TELPHER-TYPE monorail crane handles pouring ladle. Controlled low speed allows traveling at same rate as mold conveyor. Heat-resisting glass protects operator.



PIGGING MACHINE of blast-furnace type is so located in foundry that it can be served by any of five pouring cranes for disposal of iron.—Foundry, Aug, p72

Metalworking Shorts from Overseas Shops

▶ **Australia**—Variation of flame spinning corrects dimensional accuracy of concrete-mixer bowls made by Lightburn & Co. at Camden Park, South Australia. Bowls are spun for 2 min. under an oxyacetylene flame until a 3-in. wide red band appears. Case-hardened rollers are brought to bear on the heated zone to expand metal from the inside and iron out surface defects.—Mach, July 14, p1059

▶ **Japan**—Machinery production plan worked out by the Japanese International Trade and Industry Ministry for the current fiscal year indicates possible export surplus of $974-million worth of machinery.—Mach, July 21, p1099

▶ **Wales**—Steel Co. of Wales has opened the largest strip mill in Europe at its Abbey Works. When full production is reached, the mill will produce well over a million tons of steel a year. Main unit is an 80-in. hotstrip mill of 46,000 hp. Strip speed at exit end of the finishing stands is 2,000 ft. per min.—Mach, July 28, p1135

▶ **France**—Fabricators are feeling the shortage in metals. Aluminum is plentiful, but scarcities are increasing in lead, zinc, and copper. Shortages of coke and scrap are limiting steel production.—Mach, Aug 4, p1171

Double-Row Tree Planter

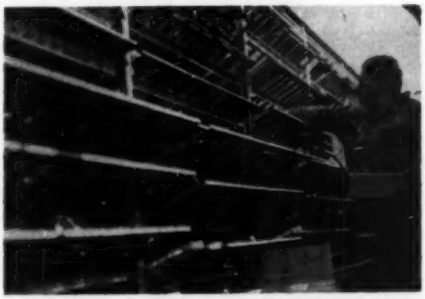
New tree planter was built by Nekoosa-Edwards Paper Co., Wis., for its own use. Two standard Lowther planting rigs are mounted side by side on the rear of an International TD6 crawler tractor.

Entire mechanism can be elevated instantly by hydraulic jacks in turning around at the end of the field. Other standard planters operate like trailers and need more turning room and time.

On the first 8-hr. trial run, 24,000 trees were planted. This is nearly double the number usually planted with single-row models. The machine requires four men and one tractor to do as much work as six men and two tractors with single-row planters.—Paper Ind, June, p272

Saves Time for Shopper . . .

. . . Saves Work for Clerk



Drug-O-Mat, new self-service method for selling drugs, is winning smiles from customers and storekeepers. Designed by Grand Union Co., the Drug-O-Mat consists of a battery of inclined chutes fed automatically by gravity. A shopper takes out a drug item and another slides into place. It cuts shopping time by two-thirds. It allows the storekeeper to display up to 800 items at once, spurs impulse buying, permits easy stocking from behind.—Business Wk, July 28, p52

These Safeguards Help Cut Bridge-Crane Accidents

Western Electric Co. wanted to make certain that its bridge cranes were not a source of injury to personnel and damage to materials. So, after a survey of crane operation, they adopted these safeguards:

1. A circular mirror on one crane shows the operator the floor hazards under and behind the cab.

2. Telescoping lifter, portable and floor-operated, improves maintenance safety. Maintenance men use the lifter to work on the undersides of cranes and cabs, and on grapples.

3. Warning bell sounds automatically the moment the crane starts. An electrical interlock with the travel motor keeps the bell ringing while motor runs.

4. Minimum ground personnel are allowed in the crane bays.

5. A hand grip attached to the wall above the rail gives the repairman a secure hold while moving along the rail.

6. Anti-collision devices have been installed wherever two or more cranes operate on the same runway.

7. "Dead-man" controls automatically stop the crane when the operator releases the travel controls.

8. Automatic stopping devices ease cranes to a standstill when they enter end zones. Timing relays reset the control circuits after a few seconds so crane can be operated in end zones.

9. Cab-controlled grapples have limit switches to prevent lifting a reel before it is fully engaged by the grapple arms.—Factory, Aug, p84

Superior Animal Shortening

New shortening, consisting of rendered lard, edible beef fat, and hydrogenated lard, is manufactured by a four-stage process at E. Kahn Sons' plant.

1. Hog fat is rendered into pure lard by wet steam in the conventional way, and the lard is cooled.

2. Part of the lard is hydrogenated by mixing with nickel catalyzer, deaerating, and reacting with hydrogen. Hydrogenated fat passes continuously through plate and frame filters to remove catalyst.

3. Shortening is blended by mixing lard, hydrogenated lard, and beef fat in a mechanically agitated tank. It is deodorized in a five-stage deodorizer tank that is actually a Dowtherm-heated, high-vacuum unit.

4. Shortening is polished in a pressure filter, given an addition of antioxidant, plasticized, and packed for shipment.—Food Eng, Aug, p88 and 136

INFRARED CURES SYNTHETIC ENAMEL

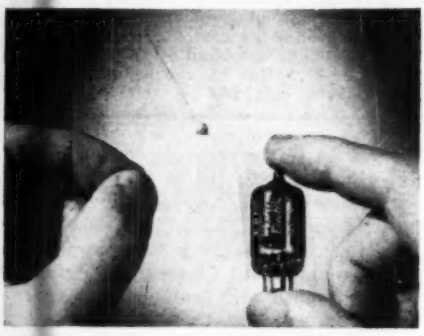
Two minutes of intense, zoned infrared heat in aerial radiant oven cures synthetic enamel sprayed on small engine made by McCulloch Motors Corp. Oven is conveyorized by trolley system. Zones are 4 ft. long; each zone is heated by seven 1,800-w., 230-v. units bolted to curved steel bands. —Elec C&M, Aug, p51

NEW EQUIPMENT...

Self-rescuer Lasts 30 Min.—Compact lightweight device protects wearer for 30 min. in air contaminated with CO. Unit can be carried personally or can be readily stored at strategic locations. Cartridge replacements cost little.—**Mine Safety Appliances Co.**—Coal Age, July, p110

Camera Copies Master Plate—All office forms, charts, letters, or drawings can be copied ontc a paper master plate in less than a minute with new camera. Paper master can then be duplicated with a multilith process machine. Camera uses static electricity and powder.—**Haloid Co.**—Am Business, June, p56

Floor Sander—Special drum pressure control on new sander allows selection of any one of five stages of cutting pressure. Fan picks up dust. A heavy-duty 2-hp. motor powers the sander.—**Porter-Cable Machine Co.**—Hardware Age, Aug 9, p96



ANOTHER NEW TRANSISTOR

Bell Telephone Laboratories has developed a new type of amplifier called a junction transistor. It has no point contacts. Instead it consists of small bead of rod-shaped germanium that is treated so a thin electrically positive layer is sandwiched between two electrically negative ends. Transistor requires about one-millionth of power of vacuum tube and can amplify electrical signals a million times.—Elec World, July 23, p28

Improves Wet Fastness—New fixing agent improves wet fastness of direct dyeings of cotton, rayon, and other cellulosic fibers. When used with copper salt for selected colors, agent improves fastness to washing and water.—**General Dyestuff Corp.**—Textile World, July, p150

Self-powered Conveyor—Mono-Dyne is battery-powered unit that drives self along overhead conveyor track. Wiring is not needed. Unit can be easily added to present manually operated systems.—**Bloom Systems, Inc.**—Iron Age, July 12, p40

Finds Leaks—Ability of certain materials to fluoresce when exposed to ultra-violet light is basis for new leak detector. Fluorescing agent is dissolved in material in the vessel. Any leak is spotted quickly under light from battery-powered light.—**George W. Gates Co.**—Chem Wk, June 30, p22

Handles Oil-well Pipe—Power equipment to handle drill pipe cuts round-trip time by 25-30% and reduces worker fatigue and hazards. Basic items are remote-controlled pipe racker, power elevator, remote-controlled tong unit, power slips, and master control console.—**Byron Jackson Co.**—Oil & Gas J, July 12, p102

Packaged Boiler—Tito-steam boiler is fully automatic with single pushbutton-controlled station. Generator mounts on a steel skid. No stack is needed; roof vent is sufficient. Thermal efficiency runs not less than 80% for oil and 75% for gas firing.—**Struthers-Wells Corp.**—Power, Aug, p182

Yard Donkey Spots Trailers—Towing unit with 18,000-lb. capacity is designed for fast switching and spotting of truck semi-trailers. Air-brake-line connections are provided to trailer brakes. Hydraulic fifth wheel raises trailer high enough so that "landing gear" need not be cranked up during switching operations.—**American-Coleman Co.**—Fleet Owner, Aug, p79

. . . AND MATERIALS

Lamp Chases Odors—Tiny lamp, the Odorout, dissipates odors by output of ozone-inducing radiations. It changes odor molecules in air instantly as ultraviolet radiations transform oxygen around lamp into ozone, an air purifier. It destroys odors from cooking, smoking, dampness, mildew and perspiration.—**Westinghouse Electric Corp.**—Elec C&M, Aug, p72

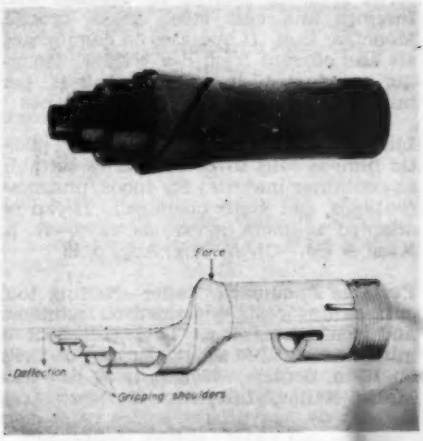
Loads Pallets Automatically — Mechanized pallet loading saves time and labor. Cartons or cases are conveyed to top of loader where they are positioned automatically and pushed onto pallets. Loaded pallets leave machine by roller gravity conveyor.—**Lamson Corp.**—Mod Packaging, June, p126

Huge Surface Grinder — Rotary-table, vertical-spindle grinder carries 42-in. abrasive wheel. Magnetic chuck, 72 in. in dia., is machined from solid steel disk. Grinder is 10 ft. 7 in. wide and 20 ft. long.—**Blanchard Machine Co.**—Am Mach, July 9, p19

Machine Brands Tubing—Machine that looks like a typewriter heat-brands Vinylite tubing that identifies wires in electrical systems. Type is available in special symbols and various languages.—**Ralph C. Coxhead Corp.**—Business Wk, Aug 18, p62

Leaner Nickel Alloy—Incoloy, containing 35% Ni, 20% Cr, and balance Fe, has been developed to save nickel. It is for use in high-temperature conditions and is available in most standard mill forms.—**International Nickel Co.**—Iron Age, July 19, p119

Distributor Makes Windrows—Cement is dropped into the hopper on rig that is attached to the rear of a truck. A calibrated rotary vane then meters it on to the windrows that are automatically troughed by an axle-high V-spreader on front of distributor.—**Wood Mfg. Co.**—Const Meth & Equip, Aug, p112



MANDREL EXPANDS LIKE COLLET

New mandrel simplifies holding workpieces during machining. Made in one piece, it is slotted to form three cantilever sections that deflect to hold workpiece. Three gripping diameters range from 7/32 to 1½ in. As mandrel is tightened, spiral segment deflects outward to engage work inside diameter. Mandrel is made by E. Westberg Co.—Prod. Eng, Aug, p134

Printing Calculator—Automatic printed multiplication, division, addition, and substraction are features of a new calculating machine. Some of the tasks handled with the new machine are computing payrolls, inventory, interest, order extension, markup or markdown, percentages, and discounting.—**Underwood Corp**—Am Business, July, p52

Slows Screen Clogging—Electric screen heater speeds up the screening of moist clay or other materials by reducing clogging of screen. Heater works on woven wire screens 2-mesh and smaller, either old-style gravity screens or modern vibrating types.—**F. R. Hannon & Sons**—Eng & Min J, Aug, p101

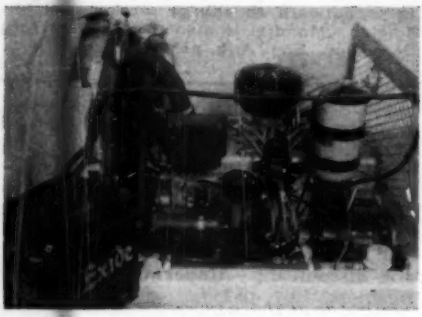
NEW EQUIPMENT (Cont.)

Cutting Torch—New cutting and gouging torch removes defects in castings and forgings and cuts steel, brass, bronze, Monel, or iron. It operates on compressed air and current from d-c. welder. Gouging speed is ⅜-in. groove at 2 ft. per min.—**Aircar Co.**—Weld Eng, Aug, p46

Lines Packages—K-flex DV, a vinyl plastic film, is said to be especially suitable as container material for foods, pharmaceuticals, and many chemicals. It can be adapted as liners in various ways.—**R. L. Kuss & Co.**—Chem Eng, Aug, p143

Portable Pneumatic Nailer—Nailing tool cuts nailing costs one-third on subfloors and roof sheathing. Tool will nail a minimum of 5,000 sq. ft. per day of 1x6's on 16-in. centers. Weight is 30 lb.—**Nu-Matic Nailer, Inc.**—Am Builder, Aug, p-148

Electromagnetic Drill — Carbide-tipped spiral-fluted drill automatically rotates. Rubber ratchet mechanism actuated by recoil of each blow of piston—3,600 blows per min.—provides rotation.—**Syntron Co.**—Eng News-Rec, Aug 9, p99



SPARK-SHIELDED FORK TRUCK

Anti-spark, gasoline fork truck has been developed for operation in gaseous and dust-laden areas. Features are shielded electrical equipment, water-type exhaust manifold, water-cooled muffler, and static-conductive tires. Manufacturer is Yale & Towne Mfg. Co.—Food Eng, Aug, p131

Clad Steel Strips—Silver brazing alloy is precoated on one or both sides of steel strip, thereby simplifying brazing and eliminating voids. Braze-Clad is made in thicknesses down to 0.005 in. and in widths up to 4 in. Other metals can be clad.—**American Silver Co., Inc.**—Prod Eng, Aug, p188

Small Rectifiers—Hermetically sealed rectifiers are available with current ratings from 300 microamperes up to 60 milliamperes. Individual cartridges accommodate up to 400 cell elements with d-c. voltages up to 8,000 v. per cartridge. —**International Rectifier Corp.**—Aviation Wk, Aug 13, p55

Finds Concealed Outlets—Working on magnetic-draw principle, outlet finder locates concealed outlets in steel underfloor raceways. As unit is moved by hand over an outlet, noticeable pull of permanent magnet inside housing indicates exact location.—**National Electric Products Corp.**—Elec Whols, Aug, p87

New Violet Dye—Calconyl Violet Powder produces a blue-shade violet of excellent brightness. It was developed for either roller or screen printing on cotton or viscose fabrics. Properties are economy, clearness of shade, and good workability. —**Calco Chemical Div., American Cyanimid Co.**—Textile World, Aug, p156

Opposed Impeller Pumps—Multi-stage pumps are designed for service up to 1,000 gal. per min. and 1,200 psi. at 350-400° F. Uses include boiler feed, general liquids in oil refineries, and water services such as descaling. Impellers are mounted back to back to balance axial thrust.—**De Laval Steam Turbine Co.**—Oil & Gas J, Aug 2, p101

Shaves Large Gears—Both internal and external spur and helical gears with face widths up to 40 in. and pitch diameters to 100 in. are shaved on new Red-Ring gear-shaving machine. Gear is mounted on large rotary table and drive cutter. Cutter head reciprocates in slide on movable vertical column.—**National Broach & Machine Co.**—Am Mach, July 23, p176

LOOKS LIKE THE REAL THING

Toy car is an exact scale model of the Henry J, Kaiser-Frazer's low-priced car. The model, scaled 1 to 25, is molded of Hercocel A cellulose acetate in colors to match the paint jobs on real Henry J cars. The model is molded by U. S. Plastics Corp. —Mod Plastics, Aug, p95

Natural-gas Engine—Model LR-600-GAS engine is 1,100-rpm. unit designed for power plants, pipe-line pumping stations, oil-well drilling, cotton gins, and other services, in oil-producing areas. Six-cyl. spark-ignition engine rates 315 hp.—**Cummins Engine Co., Inc.**—Power, Aug, p164

Tilting-spindle Sander — Sander and grinder for wood, metal, and plastics features tilting spindle rather than tilting table. Spindle can be used oscillating or non-oscillating and tilted from vertical position to 45°.—**Kindt-Collins Co.**—Foundry, Aug, p 214

Aluminum Cable—New 1.6-in. dia. expanded ACSR cable is reported to be largest stranded conductor ever supplied for overhead transmission line. It has non-metallic strands of fibrous material between steel core and outer aluminum strands.—**Aluminum Co. of America**—Elec World, July 30, p120

Explosion-resistant Glass — New laminated glass window, developed to reduce danger from flying glass, has one outer layer of glass and inner layer of polyvinyl butyral. Other outer layer consists of four fitted triangular pieces of glass to control breakage.—**Pittsburgh Plate Glass Co.**—Chem Wk, July 21, p21

Charges Batteries—Versatile charger can be adjusted to charge any industrial-truck battery as it has 2,000 readily selected charging-cycle characteristics. It is fully automatic and accomplishes correctly tapered charging without series resistor.—**General Electric Co.**—Food Eng, Aug, p129

Shallow-well Pumps—N series gray-iron reciprocating pumps are of 250-gal.-per-hr. capacity for shallow-well pumping. They have stainless-steel piston rods, brass cylinder sleeves, sintered bronze bearigs, relief valves with bypass to suction line.—**Red Jacket Mfg. Co.**—Elec Merch, Aug, p119

Polyethylene-coated Tubing — Standard electrical metallic tubing with plastic coating requires no special wrenches. Fractures of plastic are easily repaired by wrapping with plastic tape. Coating gives excellent corrosion resistance.—**Republic Steel Corp.**—Chem Eng, Aug, p146

Plastic Coating—New plastic spray, called the U. S. Royalguard coating, will find use in protecting structural steel against corrosive chemicals and atmospheres. It combines high film flexibility with good adhesion and impact resistance. It needs no primer, comes in variety of colors.—**U. S. Rubber Co.**—Paper Ind, July, p443

READER SERVICE

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Electroformed Tooling

Dimensional stability, easy heating, and weight saving are among advantages of electroformed tooling for low-pressure laminates

MOLDS UP TO 9 FT. LONG with molding surface areas as high as 32 sq. ft. are now being successfully electroformed. Molds are produced by electrodepositing nickel or copper over the surface of a suitable matrix, usually cast phenolic, to about ⅛-in. thickness, and then removing the deposited shell from the matrix. The inside of the metal shell forms the mold cavity.

Preparing the matrix starts the process of electroforming a low-pressure-laminate tool. A plaster splash is taken from the plaster master and into this is cast a phenolic resin to form the matrix.

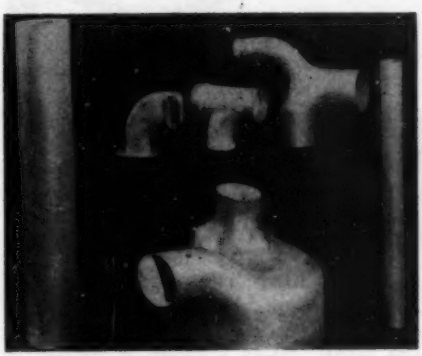
After the matrix has been cast, it is mounted for suspension in the electroforming bath, and the surface made electrically conducting. Contact points are provided around the edge of the matrix for proper distribution of current over its surface.

The desired thickness of metal is deposited on the matrix in electroforming baths. This type of tool is usually electroformed of 100% nickel.

On small tools or where maximum strength and rigidity are not too important, a nickel-copper or nickel-iron can be substituted. In such cases, a 0.010-in. to 0.020-in. thick layer of nickel is always provided as the molding surface.

After the required metal thickness is attained, the electroformed mold is removed from the bath while still on the matrix. Mounting brackets and stiffening members are welded to the outside surface. A band-saw or milling operation separates the mold cavity from the matrix.

The finishing operation includes chemical removal of the initial flash coating of copper from the nickel molding surface. A final light buffing brings out the high finish imparted by the matrix.



***ELECTROFORMED CONSTRUCTION** of parts produces 20% weight reduction by eliminating seams and welds and by using thin-wall sections*

Several methods can be employed to heat electroformed molds. Steam or hot water can be circulated through copper tubing attached to the back surface of the mold. Electrical strip heaters can also be attached to the back of the mold as a heating medium.

On large tooling, heating tubes are electroformed into the walls of the mold. This makes them an integral part of the electroformed structure and provides a ribbed, reinforced construction.

Many types of low-pressure-laminate molds have been successfully electroformed. Among them are the single-cavity mold that can be used with a vacuum bag or with a flexible rubber membrane backed up by a cast-alumi-

num or glass-cloth pressure plate. Most glass-cloth parts are produced with this type of mold.

Matched cavity molds are needed with glass-mat type parts and with resin parts. Matched cavity molds exposed to high pressures should be electroformed of 100% nickel for maximum strength and rigidity.—Auto Ind, Aug 1, p32

Sorting and Washing Plant Cuts Milling Costs 15%

A new sorting and washing plant at Silver Bell Mines Co. eliminates waste from the mill feed with the result that milling costs have been reduced about 15%. Two veins are being mined.

Hard diorite from one vein caused excessive wear on crushing and grinding equipment. Soft clay-like, water-saturated gouge from the other vein caused gumming and sticking of milling equipment. Consequently the sorting and washing plant was installed.

Material from the coarse-ore bin is fed into the trommel of the washing plant by a pan feeder where the feed is washed with a spray. The perforated section allows all minus ¾-in. material to fall into a hopper from which it is fed to a classifier.

Sands from the classifier are discharged directly onto the conveyor through a hole cut in the bottom of the classifier and over the center of the belt. Overflow from the classifier is fed to a concentrating table for deslimming. Sands go to a ball-mill classifier, and slimes go to the tail race.

Plus ¾-in. material is discharged onto a sorting belt. Two men pick out waste and discard it. From the sorting belt, cleaned ore is fed to the crusher. Crushed ore is conveyed by belt to the mill where it is ground and treated by standard flotation methods.—Eng & Min J, Aug, p76

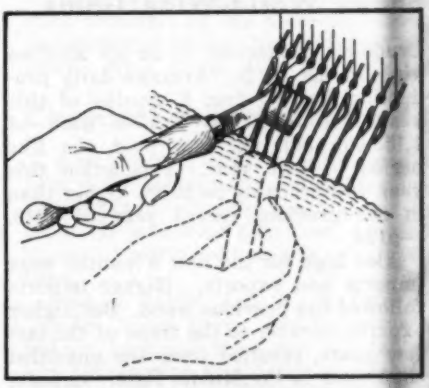
Water Boom for Fluorides

All over the U. S., waterwork engineers are figuring costs of adding sodium fluoride to their municipal supplies. At present, 174 communities either are adding fluoride or have ordered equipment to do so.

The new technique, claimed to cut tooth decay in half, is urged by U. S. Public Health Service and other health associations and officials. So far, only 1% of the national water supply is now being treated.

Adding fluoride must be controlled to 1 part per million within narrow limits. Dry feeders are better on large installations. Liquid feeders are suitable for single wells.

Prominent among equipment makers are Wallace & Tiernan Co., Inc.; Omega Machine Co.; Proportioneers, Inc.; Permutit Co.; Infilco, Inc.; and Syntron Co. —Chem Wk, July 7, p14



REMOVES BROKEN NEEDLES

Simple tool helps remove broken or damaged bearded needles from warp-knitting machines without tangling or catching yarns. Pressing tool is made of brass or steel plate whose width is nearly equal to that of the needle mold. To remove needles, insert tool as shown, push up mold, and then pull it down while pressing the beards with the tool.—Textile World, Aug, p172

VPI Packaging Material Replaces Cosmolene and . . .

OLD METHOD—A heavy coating of grease on each rifle protects it from corrosion. Before the rifles can be fired, they must be disassembled, degreased, and reassembled. Solvents, rags, and a brush, plus plenty of scrubbing, are required. It takes one man 2 hr. and 45 min. to clean one rifle. Under combat conditions, time would be at a premium. Removing the heavy grease may damage the rifle, and solvents are a hazard.

Production of Crude Oil Shows World-Wide Gains

Crude-oil production is at an all-time high in the U. S. Average daily production for the first 6 months of this year was 6,062,000 bbl.—a gain of 1,153,000 bbl. per day over the like period of last year. Production this year will probably be 10½% higher than in the previous record year of 1948. —p194

Also high for the first 6 months were imports and exports. Higher imports followed the previous trend. But higher exports, counter to the trend of the last few years, resulted from the unsettled conditions in the Middle East. Imports averaged 895,000 bbl. daily, and exports 335,000 bbl. daily.—p202

Crude-oil production was high outside the U. S. (exclusive of Russian-controlled areas). The first 6 months showed a 20% increase—from 3,874,300 to 4,664,700 bbl. per day. During the same period, estimated gain in Russia and Eastern Europe was 7.7%—from 857,000 to 923,100 bbl. per day. Canadian increase was a spectacular 60%. Other outstanding gains were made in Colombia, Saudi Arabia, Kuwait, and British Borneo.—Oil & Gas J, July 26, p205

Evaporator-Feed Water

Boiler makeup water at Public Service Electric & Gas Co.'s Sewaren, N. J., power plant must be treated to produce an evaporator vapor of optimum purity.

Raw water is first treated in a cation-exchange system with a phenolic resin as the exchange medium. The system operates on the hydrogen cycle with up-flow regeneration. Aeration then removes free carbon dioxide, and the pH is regulated by adding caustic soda.

Treatment gives (1) a total hardness leaving the aerator not over 3 parts per million, (2) a free CO_2 leaving the aerator not over 5 ppm., and (3) a pH of treated water after adding caustic soda averaging not more than ± 0.2 of a pH unit from the set control point.—Power, Aug, p80

. . . The Clock Tells the Story of a Fast Cleaning Job

NEW METHOD—Kraft paper coated with a vapor-phase inhibitor (VPI) is all that is needed to protect the rifles from corrosion. VPI vaporizes slowly and steadily over a long period. It arrests the chemical action of corrosion and does not require the exclusion of either oxygen or moisture from the metal to be protected. Only 7 min. are needed to have a rifle ready for firing.—Mod Packaging, July, p92

New System Operating Maps Will Give More Information

When Consolidated Edison Co. of N. Y. explored its utility map and record structure, it found 166,540 map plates and all kinds of associated records for its 340-sq. mi. territory. So a redesign job was undertaken. The new design is a geographical map. It provides for (1) one plate for electric underground trunk ducts, structures, and duct occupancy; (2) a separate plate for overhead conductors and underground secondary mains and services; and (3) a plate for gas mains and service facilities. Plates are made of plastic.

About 60% of all plates are expected to be drawn at a scale of 1 in. =50 ft. Plates are 20 x 25 in. with a ½-in. border. The long side is the north-south axis.

The new design will require about 11,500 plates, thereby reducing the number of operating maps by 93%. Change-over cost will be returned in 5 years after the full set is completed. After that period, the system will save money.

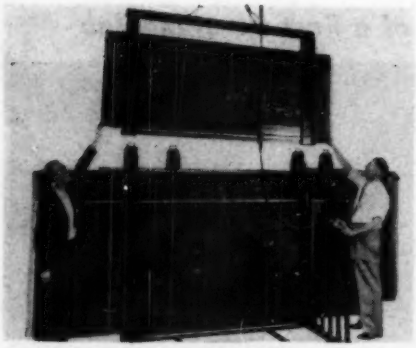
Other advantages are the complete data available at one place and identical prints supplied to both field and office.—Elec World, July 30, p88

Chemical Substitute for Ice

A new product, Noe-Ice, is claimed to retard the growth of food-spoiling bacteria without altering the taste of the food. It preserves fish, fowl, or game without refrigeration for a limited time.

Sold in tablet and liquid form by Noe-Ice Sales Corp., Noe-Ice contains sodium benzoate (12.5 mg. per tablet) and Chloramine T (25 mg. per tablet) in a base of sodium chloride. Principle market at present is for sportsmen.

Other commercial possibilities are keeping roses fresh in shipping, air-freighting sea food without refrigeration, killing odor in flower water tanks, even spraying sliced onion so it can be kept in a refrigerator without covering. —Chem Wk, July 28, p28



STOCKS SHEET METAL "BOOKS"

Sheet metal storage at Pratt & Whitney Aircraft has taken a new approach. Sheets are stocked vertically as units (pages) in a package (book) filed in a storage arrangement (bookcase). A new crate is placed on a transfer rack and a plywood book cover is substituted for the crate top. A steel channel serves as a book hinge. The transfer rack is removed and the second cover attached to the hinge. Then the book goes to storage. To remove sheets, the book is placed in a V-rack and the covers opened. Cranes do all the handling.—Aviation Wk, July 30, p37

Tallow Replaces Palm Oil

In making hot-dip tinplate, sheets of pickled steel are passed through a flux into a bath of molten tin and up through an 18-in. layer of hot palm oil floating on the tin. Rolls, operating in the oil, smooth the tin coating while the hot oil keeps the tin from becoming solid.

Research by Armour Research Foundation established that palm oil worked well because it had a fluxing action; that is, it could remove tin oxide from the molten tin surface. Free fatty acid content gave it the fluxing action.

This characteristic, plus others, suggested a possible substitute—modified beef tallow. Tested at Weirton Steel Co., it proved to be a satisfactory replacement for palm oil.—Iron Age, Aug 2, p86

Causes and Cures for Short Wool-Felt Life

Life of woolen felt in paper mills is shortened by three primary causes: chemical, mechanical and biological degradation, or deterioration. Under normal operating conditions, mechanical degradation is the chief factor.

Mechanical degradation is chiefy one of abrasion. Increasing resistance to wear can be done by (1) chemically treating the fiber to build new cross-linkages, (2) coating wool fibers with resin, and (3) building up high polymers within the individual fiber.

Chemical degradation can be reduced by eliminating wherever possible the materials that attack wool. Various phosphates have an adverse effect on wool fiber. Alkalies also attack the fiber, resulting in swelling, solubility, and, ultimately, complete hydrolysis of the fiber.

Biological degradation, caused by bacterial attack, is most simply controlled by adjusting stock pH to less than 5 or 5.5. Woolen felts can also be made resistant to attack by treating with chlorinated phenols, organic mercury compounds, or synthetic organic compounds. Most popular method is effective use of slime-control agents.—Paper Ind, July, p400

Intercoms Handle Timecards

Intercom speaker stations placed at strategic spots are used by employees when they finish one job and start another at Burd Ring Co. Two girls at a central location receive the information and mark it on timecards.

Formerly, when a worker changed from one job to another, he had to walk up to the desk, relay the information for the particular timecard, and wait until the girl had made the necessary notations.—Am Business, July, p36

How To Plan Product Colors

We know neither what color is nor how we see it, but the modern science of color engineering has shown conclusively what color can do in production, sales, use, and maintenance of a product

—Report to Management—

TWO BASIC REQUIREMENTS govern the planning of the color treatment for both consumer and industrial products. They are:

- Colors must fill functional needs.
- Colors must have the widest appeal, which means determining the subjective choice of the greatest number of prospective buyers.

The chief requirement for industrial machinery and equipment is functional. This whole field of color selection involves both psychological and factual relationships.

Psychology and Fact

For psychological reasons, red, for example, is the color to indicate high temperature or danger. Since the time of primitive man, red has been associated with heat and action in human thought and emotions.

For factual reasons, a yellow background is used to make black threads more visible in some textile machines. This color combination is considered most visible of any combination. Many school buses are therefore painted black and yellow.

But practical considerations must not be overlooked in color selection. When a railroad in the western part of the United States decided to use color on its diesel locomotives, yellow and green were selected. Though this combination was attractive and striking, it blended so well with the lush California foliage that the locomotives were almost invisible at a few hundred yards.

So silver and black were next tried, but they blended well with the silver-gray desert of Utah and Nevada. A final change to orange and black filled both practical and esthetic requirements.

Geography and Sex

Color selection must depend also on geography, time, age, sex. When gasoline pumps and stations of an American oil company doing business in China were painted white, sales dropped sharply. The reason—white in China means mourning.

During depression years, the favorite color for automobiles was black. Today the trend is toward lighter colors.

Another example—"modern" home decoration embraces lighter wood colors so the dark brown favored so long for private-home space heaters is no longer in keeping with public taste. Lighter, brighter colors and attractive two-tone effects have brought the product into harmony with public demand. Result—more sales.

Women Want Color

Women now want color in the kitchen —36% in a country-wide survey were found to like matching appliance and wall colors. A manufacturer who offered stoves in various colors realized 38% of his sales in color during the following 6 months.

In the office, the story is the same. The so-called practical black was left far behind in preference when brighter

Color in Industry

Farm Equipment — Farmers, progressive in their acceptance of color engineering, seek high-visibility colors, such as vermilion and yellow, in combines, tractors, and other equipment. These colors allow equipment to be observed from a distance to see whether the job is being done.

Lighting Equipment — Lighting for outdoor installations, such as service stations, is now coordinated with the major color of the individual oil company's trademark and serves as part of the over-all color theme. One design of a service-station lighting fixture is installed horizontally over the gasoline pumps to eliminate the unsightly high poles formerly used for outdoor lighting fixtures; the new unit can employ the same color as the station walls and pumps. Colored glass side panels at night give the fixture the same color appearance as walls and pumps.

Power Generating Equipment—Color engineering with light gray-greens, bluish grays, and medium grays in the par-

color schemes made black business machines look conspicuous and old fashioned.

But now you may say, "That's all very well. But what do I do about it? How can I pick the right colors to use on my particular product? Where do I begin to analyze the problem? And how do I satisfy the sales department's never-ending wish to have a product color that will act as a tool to build demand?"

All good questions. One answer to all of them would be to hire a color engineer. He knows how color in machine tools and factory equipment can improve morale, speed, and accuracy and, at the same time, reduce absenteeism and accidents. He knows how to weigh the accumulated facts on consumer psychology and tastes against production conditions, manufacturing economies, and product uses.

But if hiring a color expert is impossible, plan your color-selection work to answer this series of questions:

1. What is the function of the color plan?
2. What condition is the product used under?
3. What colors do competitors employ? (You want eye recognition here so people will recognize your product at a glance.)
4. Where will colors be applied on the product?
5. What psychological relationships are involved? (White in China?)
6. What background colors require consideration? (Remember the locomotives?)
7. Under what lighting will the colors be viewed?

Let's study an example. When a power-saw manufacturer introduced a new saw, he needed a color treatment that would be distinctive from those of his competitors, highly visible outdoors, and long-lasting in the finish chosen.

Major competitors had based their color plans about orange, chrome yel-

ticular shade most suitable to the interior color plan of the plant gives the bulky, heavy equipment an appearance of unity with the rest of the plant.

Printing Presses—Color engineering for machinery with dangerous moving parts has received substantial acceptance. High-visibility colors draw notice to the danger areas. Where soilage is a factor, machinery color planning helps emphasize the need for cleanliness and care. Color guides help insure that all lubrication points are recognized readily. They identify oiling and other maintenance areas and provide contrast at lubrication points.

Textile Machinery—Engineering of color and design in textile machinery improves both operators' efficiency and current value of machinery. Eliminating glare and light reflection on the working surface and providing contrast in colors and in lightness-darkness values between the working materials and the machinery background reduce the incidence of eyestrain, absenteeism, and percentage of rejects. Workers no longer have to sew black thread against a black machinery surface in poorly illuminated surroundings. The higher morale of workers resulting from better working conditions and better-appearing machinery improves equipment maintenance.

low, royal blue, and stipple-gray. So his selection was an eye-catching Chinese vermilion that was distinctive and also stood out against the outdoor background. Use of chromium finish on handles, guide bar, and chain gave both contrast to improve visibility and maximum durability on these vital parts.

Factory equipment presents practically the same problems, only to a greater extent. Correct color is particularly vital in the engineering of tools and machinery used by factory workmen.

In a hosiery plant, for example, employees in the inspection department slowed down toward the end of every day, complained of fatigue and dizziness; absenteeism soared. Analyzing the situation revealed that painting equipment blue at points of inspection gave more contrast to the tan color of the stockings, reduced eyestrain, increased accuracy, and kept the workers working.

Plant workmen are often unaware of the effect of machinery color on their operations, but respond automatically to improved conditions. Several years ago, a plastic manufacturer purchased two molding machines at the same price. One machine with a special color treatment has consistently shown better production than the other, which was painted in traditional shop colors. And, at a recent inventory, the color-correct machine was appraised at twice the value of the other machine because of the better maintenance inspired by its better color treatment.

Contrasting of values is one of the surest procedures in combining colors for effective working conditions. Dark values of one color against a light value of another color keep machine operators aware of moving parts—and away from them. A light yellow on a cutting edge, for instance, stands out sharply against a dark blue surface.

Maximum contrast is not always desirable. Pure complementary colors, which give strong contrast, will slow

production in many cases if applied to work surfaces of machinery. Yellow and blue would be overpowering on factory equipment that must be looked at constantly at relatively close range—such as the working area of a milling machine.

Warm Colors Warn

Another means of insuring safety in machinery operation is to use warm colors—those with red or yellow in them—to indicate moving parts, cutting edges, switch boxes, and other hazardous parts. Warm colors attract attention as they seem to be advancing toward the eye. Cool colors—those with blue—seem to retract from the eye and therefore can provide effective background on noncritical areas and parts.

Office machinery, as well as factory tools, is open to color improvement for increasing efficiency. Dark-colored desks, typewriters, and other office machines were found to be responsible for slowing office speed; the high contrast between white paper and the dark background created fatigue. Introducing lighter colors, of 35% light reflectance to replace the 10-15% of traditional colors, reduced contrast and eyestrain speeded up the work, made it more accurate.

Color Must Last Too

In color selection, durability of the color must be considered as well as its suitability. At one time, a particular maroon was popular for automobiles, but the pigments required to make the maroon were not durable. The result was mighty displeasing to those car owners.

Here is a similar problem that Howard Ketcham, a widely known color pioneer, worked on—and solved. In color styling diesel locomotives for the New Jersey Central Lines, he chose a design employing orange and ultramarine.

The two colors were picked, not only because of their attractive appearance, but also because their contrast would stand out sharply as they approached grade crossings. Then came the engineering job of assuring durability.

It was found that the ultramarine blue could not be matched in lacquer because the chemical required for the blue pigment ate into the nitro-cellulose component of the lacquer finish. Research then revealed that the color could be applied with a synthetic finish of the alkyd resin type to give the desired durability.

In planning any color application, the first step is to consider colors in terms of the color family. This is a breakdown roughly based on the division of the range of colors in the visible spectrum. Quality of color in each segment is the "hue".

Add Value and Chroma

Another fundamental measure for evaluating color is according to lightness or darkness. This quality is best described by the term "value".

A third aspect of color is its "strength", or "chroma". The pure green of an emerald is classed as a "strong chroma". The gray-green we see in an olive is "weak chroma".

As innumerable combinations of hue, value, and chroma exist, a color designation should be based on some system. The system in most general use in industry is the Munsell system; about 1,000 Munsell color samples are available.

Any one who must carry out such color engineering development work should recognize that there is no substitute for taste, judgment, and the facts that govern the selling appeal or functioning of a product. In applying color for product design, he should follow this standard rule—first get the facts and then apply experience and test results.—Prod Eng, Aug, p139

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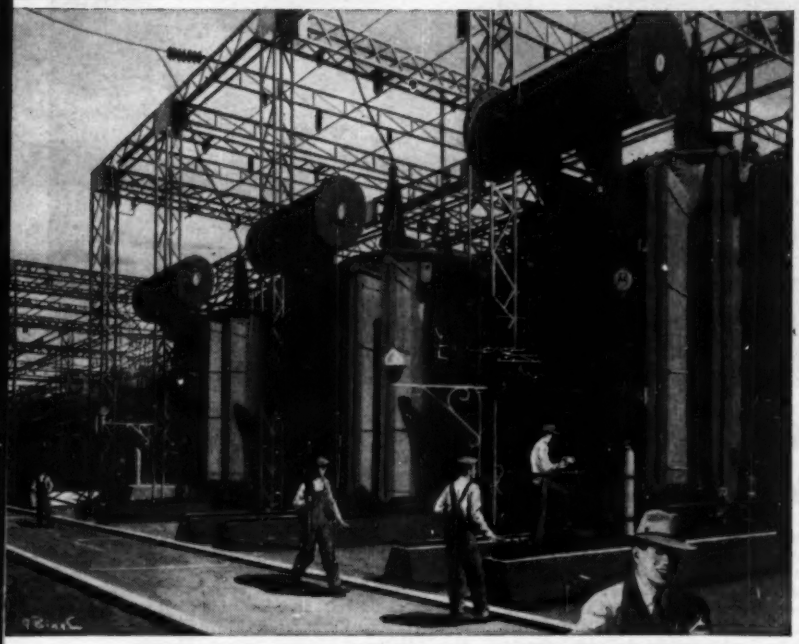

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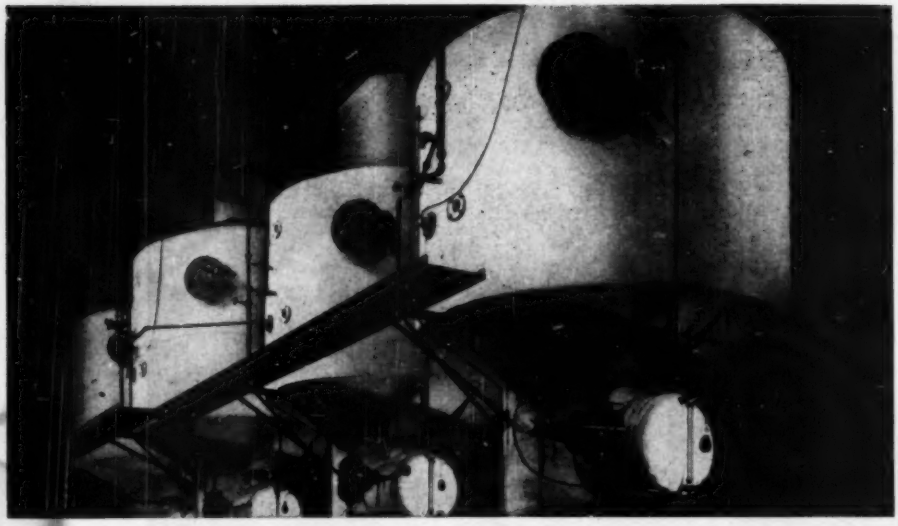

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The Swenson Long Tube Vertical Evaporator is particularly adaptable to concentration problems where no scaling is evidenced. This unit is "tailored" to fit the specific conditions under which it is to operate. The excellent results of this type on foamy liquor—and its ability to operate automatically without entrainment losses—are important features. It is extensively used on black liquor recovery in pulp mills and for heat-sensitive substances like glue and gelatine.

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	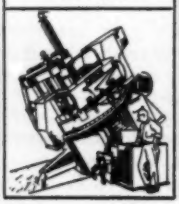	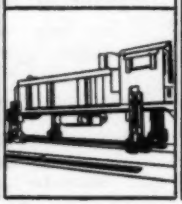	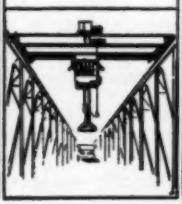	

PRODUCTION IDEAS

from Manufacturers' Catalogs

10-1 Rolling Mills—E. W. Bliss Co. 52p. Bulletin 40 describes and illustrates wide range of rolling mills and accessories and reports on their uses in ferrous and nonferrous plants. Valuable rolling data given.

10-2 Coal Preparation—American Cyanamid Co. 36p. Booklet discusses heavy-media separation processes for coal preparation and illustrates related equipment.

10-3 Latin American Progress—National City Bank of New York. 48p. Four bulletins tell of industry, trade, and economy of four Latin American countries—Brazil, Cuba, Mexico, and Puerto Rico.

10-4 Torque Converter—Twin Disc Clutch Co. 16p. "Production Road" publication features operation of Twin Disc torque converter, plus variety of articles.

10-5 High-alloy Castings—American Brake Shoe Co. 56p. Catalog T-155 covers properties and uses of heat, corrosion, and abrasion-resistant alloys.

10-6 Forms and Trims—Whiting Corp. 20p. Stamping trimmer, described in bulletin QW-123, forms, beads, and trims sheet-meal stampings. Four models are available.

10-7 Concrete Mixer—Kwik-Mix Co. 12p. Catalog KM 313 describes 16-S Dandie, a 16-cu. ft. portable concrete mixer with end or side discharge.

10-8 Process Control—American Machine & Metals, Inc. 24p. Air relays, various controllers, motor valves, and recorder-controllers are covered in catalog 500.

10-9 Packing-House Equipment—Food Machinery & Chemical Corp. 16p. Bulletin L-715B covers apple, peach, and tomato grading and handling machinery.

10-10 Unit Substations—International General Electric Co. 44p. Catalog GEA-3592E covers in great detail load-center unit substations for power distribution. Many installations are pictured.

10-11 Gasoline Stripping Plant—Blaw-Knox Co. 24p. Bulletin 2225 treats in detail gasoline absorption and stripping plants. Technical data section is extensive.

10-12 Hand Trucks—Lewis-Shepard Products, Inc. 36p. Bulletins 26, 29, and 31 cover hand-lift trucks, skid platforms, all types of hand trucks, and storage racks.

10-13 Story of Aluminum—Reynolds Metals Co. 44p. "Reynolds Aluminum" tells how aluminum is made, from bauxite mining to processing, and what it is used for.

10-14 Electrical Equipment—Muirhed & Co., Ltd. 238p. 1951 catalog offers resistors, resistance networks, capacitors, inductors, a-c. bridges, oscillators, components, magslips, servo components, and many other types of electrical equipment.

10-15 Construction Equipment—Baldwin-Lima-Hamilton Corp. 124p. Bulletin No. 034-G covers the ¾- or 1-cu. yd. type 34 shovel, crane, dragline, or pull-shovel machine; No. 64-D, the 1½-yd. type 604; No. 82-G, the 2-yd. type 802; No. 121-F, the 3½-cu. yd. type 1201; and No. 240, the 4- to 6-cu. yd. type 2400.

10-16 Lubricated Valves—Rockwell Mfg. Co. 40p. Bulletin V-214 covers power-operated Nordstrom valves and their uses.

10-17 Taylor Technology—Taylor Instrument Cos. 40p. Vol. 3, No. 4 of this publication tells of the company's growth during its 100 years and its products.

10-18 Gypsum Products—Certain-Teed Products Corp. 48p. Catalogs 5550 and 5660 give complete details on gypsum lath, plaster, wallboard sheathing.

10-19 Industrial Brushes—Pittsburgh Plate Glass Co. 36p. Bulletin 11-50-5M tells how industrial brushes solved 12 surface-preparation problems. Bulletin 6-51-34M describes Neoceta paint brushes.

10-20 Tilting-cab Truck—White Motor Co. 18p. Form AD-285 is a picture story of what the tilting-cab White 3000 truck can do in efficient hauling.

10-21 Laundry Equipment—American Laundry Machinery Co. 8p. Form 2583 illustrates many types of industrial laundry equipment.

10-22 Water Conditioning—Permutit Co.

PRODUCTION IDEAS (Cont.)

8p. Folder describes and illustrates zeolite softener, precipitator, spiractor, filters, and other types of water-treating equipment.

10-23 Circuit-breaker Panelboards—Westinghouse Electric International Co. 20p. Catalog B-5260 describes circuit-breaker panelboards for control of lighting, appliances, and other power applications.

10-24 Machine Tools—Cincinnati Milling Machine Co. 48p. General catalog M-1712 describes milling machines, die sinkers, broaching machines, cutter grinders, cylindrical and centerless grinders.

10-25 Caustic Soda — Pennsalt International Corp. 24p. Form H-570 treats buying, handling, storage, equipment design, and technical data. It includes valuable engineering charts and tables.

10-26 Remote-control Dictation — Thomas A. Edison Inc. 12p. Two-color booklet tells about televoice—the way to reduce costs of dictating letters, reports.

10-27 Measure Viscosity—Fischer & Porter Co. 12p. Catalog 88 gives complete data on Viscorator instruments for determining liquid viscosity in industrial processes.

10-28 McGraw-Hill Books — McGraw-Hill International Corporation. 318p. The 1951 catalog describes over 2,000 books on business, industry, and general subjects.

10-29 Fork Trucks—Mercury Mfg. Co. 16p. Bulletins 295, 210-A, and 210-B describe fork trucks with capacities of 2,000, 4,000, and 6,000 lb.

10-30 Crush Coal—Jeffrey Mfg. Co. 40p. Catalog 784-A illustrates and gives complete data on coal crushers of all types.

10-31 Unit Heating—Surface Combustion Corp. 16p. "Businessman's Blue Book of Better Heating" discusses gas-fired heaters.

10-32 Portable Electric Tools—Black & Decker Mfg. Co. 72p. Catalog gives complete description of over 100 tools and several thousand accessories.

10-33 Centrifugal Pumps—Barnes Mfg. Co. 20p. Form 211-151 describes line of automatic self-priming pumps from 4,000- to 90,000-gal.-per-hr. capacities.

10-34 Paper-mill Maintenance — Wallace Clark & Co. 16p. "Planned Maintenance" reprints six articles from Paper Industry on maintenance in paper mills.

10-35 Petroleum Refining—M. W. Kellogg Co. 24p. No. 1 issue, 1951, of "Kellogram" tells how a 25-year old refinery was modernized by adding cat cracking and revamping other processes.

10-36 Traps Steam—Yarnall-Waring Co. 24p. Yarway impulse steam traps for power plants and other industries using steam are described in catalog T-1740.

10-37 Mining Equipment—Joy Mfg. Co. 16p. In Bulletin M-211 is recorded the result of 100 years of building mining equipment—continuous miner, loading machine, shuttle car, cutters, conveyors.

10-38 Building Hydraulic Presses—R. D. Wood Co. 32p. Bulletin describes the care of manufacturing modern hydraulic presses and how they are made.

These manufacturers' catalogs will be sent free to subscribers. Fill in squares with catalog numbers desired and mail to the Editor, McGraw-Hill Digest, 330 W. 42nd St., New York 18, N. Y., U. S. A.

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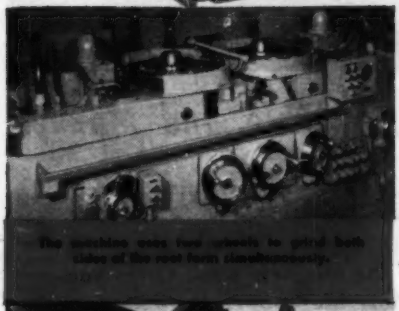
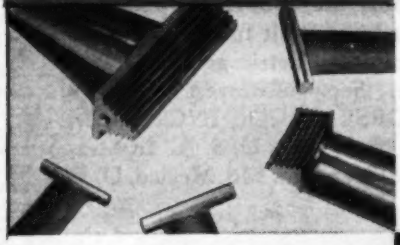
EX-CELL-O Machine Grinds Jet Blade Roots



The machine uses two wheels to grind both sides of the root form simultaneously.



Dovetail and pinetree forms, in various sizes, are ground from rough forgings.

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This production-proved Ex-Cell-O Precision Two-Wheel Form Grinder finishes roots of jet engine blades with speed, economy and precision. It is fully automatic except for loading, unloading and pushbutton starting.

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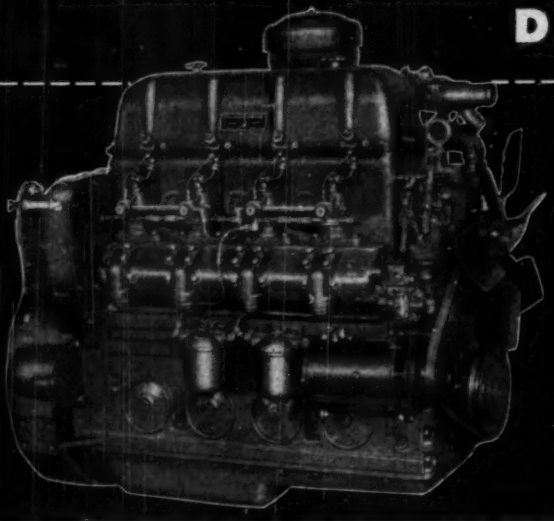

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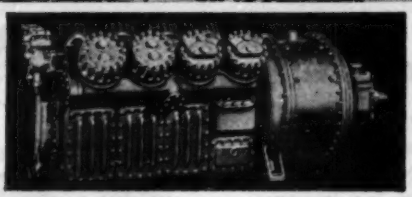

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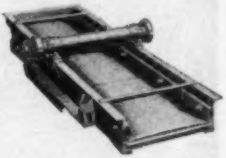

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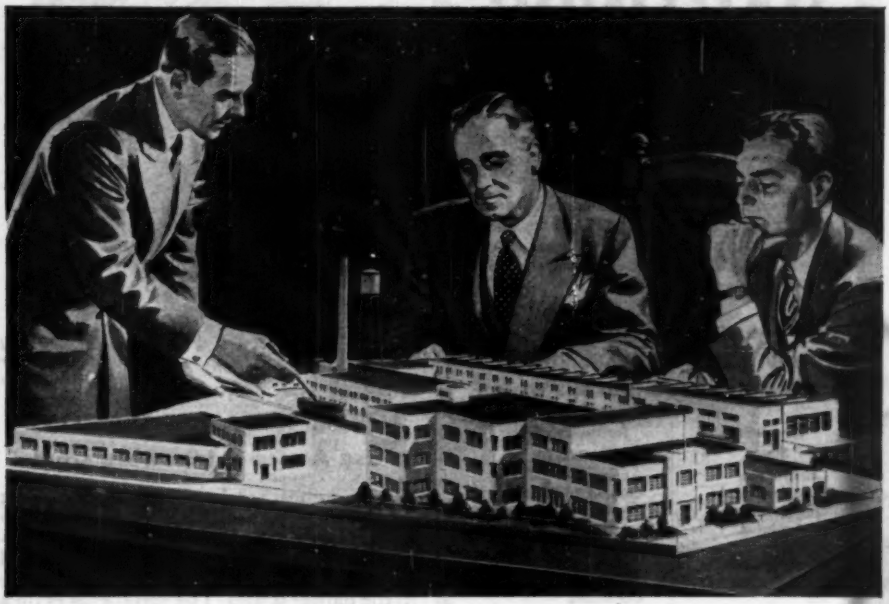

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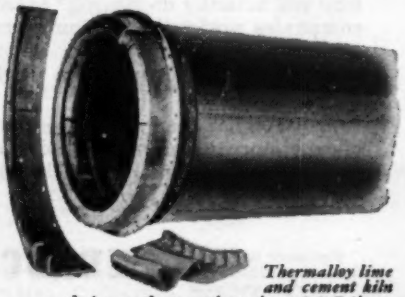

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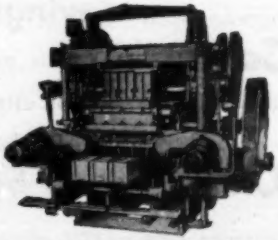

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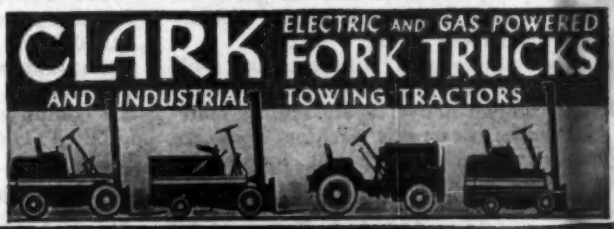

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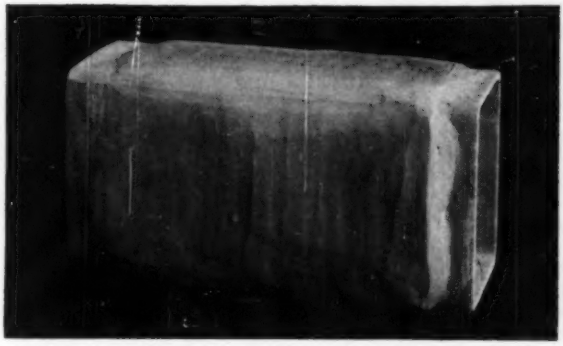

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